

MASS.
DOCS.
COLL.

*

UMASS/AMHERST

*



312066 0285 1936 3

REPORT
- OF
HARBOR AND LAND
COMMISSIONERS


1899

UNIVERSITY OF
MASSACHUSETTS

GOODELL
LIBRARY



THE BOOK-PLATE IS A GIFT OF DR. WILLIAM GOODELL



Digitized by the Internet Archive
in 2011 with funding from
Boston Library Consortium Member Libraries



ANNUAL REPORT

OF THE

BOARD OF HARBOR AND LAND
COMMISSIONERS

FOR THE YEAR 1899.

BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE.
1900.

Commonwealth of Massachusetts.

REPORT.

To the Honorable the Senate and House of Representatives of the Commonwealth of Massachusetts.

The Board of Harbor and Land Commissioners, pursuant to the provisions of law, respectfully submits its annual report for the year 1899, covering a period of twelve months, from Nov. 30, 1898.

From Dec. 1, 1898, to Nov. 30, 1899, the Board has held 244 meetings, has given 344 formal and informal hearings, and has received 192 petitions for license to build and maintain structures and for privileges in tide waters, great ponds and the Connecticut River, to dredge material, to remove material from beaches, and for other purposes, being an increase of 31 meetings, 62 hearings and 20 petitions, over last year.

One hundred and sixteen licenses for structures and privileges in tide waters, great ponds and the Connecticut River have been granted during the year; also 38 permits for dredging, for the removal of material from beaches, and for other purposes.

During the year the Board has made 18 contracts, involving the payment of \$193,738.89 under appropriations made by the Legislature.

On June 20 and September 19 the Board met with the Board of Railroad Commissioners, acting as a joint board, under chapter 448 of the Acts of 1899, and heard counsel and others interested in the petition of the Boston, Cape Cod

& New York Canal Company, for authority to issue stock and bonds.

On October 2, 27, and November 2, 16, the Board met with the Board of Railroad Commissioners, acting as a joint board, under chapter 99 of the Resolves of 1899, and heard counsel and others in the matter of the New Bedford and Fairhaven bridge.

On November 28 the Board gave a hearing to parties interested in the matter of proposed plans of the location and construction of a canal between Buzzards Bay and Barnstable Bay, filed by the Boston, Cape Cod & New York Canal Company, under chapter 448 of the Acts of 1899.

On January 25 counsel for the Old Colony Railroad Company withdrew the petition and plans of said company, filed with the Board Dec. 28, 1898, for license to do anything in South Bay which, by the terms of the decree of the superior court for the abolition of the grade crossing of Dorchester Avenue, dated June 23, 1898, said company is required to do in tide water.

On February 15 Richard A. Everson and others, petitioners for license to construct dams and flumes and draw water from Maquan Pond in Hanson for flowing cranberry bogs, were given leave to withdraw, it appearing that the water in this pond could not be lowered without exposing the shores and injuriously affecting owners of property abutting thereon.

On March 29 the petitions of Floretta Vining and T. C. W. Nash for authority to remove material from Stony Beach in Hull, under chapter 163 of the Acts of 1878, were dismissed, as it appeared that there was a question as to the title of the petitioners to a portion of this beach.

On May 12 the trustees of the Boston Real Estate Trust withdrew their petition for license to fill solid in Fort Point Channel adjoining the southerly side of Congress Street in Boston.

On May 17 the Board refused to grant a license to Henry W. Goodnow to build a wharf in Lake Quinsigamond, near the causeway in Worcester, as the petitioner could attain his object by dredging adjacent to his existing wharf in this location.

On May 29 Henry W. Goodnow, petitioner for license to build a wharf in Lake Quinsigamond in Shrewsbury, was given leave to withdraw, as the owner of the land in front of which the wharf was to be built objected thereto.

On June 26 the Wellington-Wild Coal Company, petitioner for license to extend a wharf on the canal near Bridge Street in Cambridge, was given leave to withdraw.

On November 22 Harrison Mitchell and John C. Augustus, petitioners for license to build wharves in Hull Bay on Stony Beach in Hull, were given leave to withdraw.

Inspections have been made by the Board at various times of work completed and in progress under appropriations made by the Legislature on the Commonwealth flats at South Boston, the Province Lands in Provincetown, at Osterville, Green Harbor, Lake Anthony, Scorton harbor, Menamsha Inlet and Witchmere harbor; also of the sites of proposed work in tide water, great ponds and the Connecticut River, upon petitions and plans presented to the Board, and of various beaches, relative to the proposed removal of material, and damage caused by the great storm of November, 1898.

THE COMMONWEALTH FLATS AT SOUTH BOSTON.

This considerable asset of the Commonwealth is steadily increasing in value.

The plant of the Metropolitan Coal Company, at the southeasterly corner, with its increasing business, shows the adaptability of the adjacent lands for commercial purposes.

The Commonwealth pier, now nearing completion, indicates the availability of the water front for commerce and maritime uses.

The opening to travel of the new Summer Street bridge across Fort Point Channel, and the early fulfilment of the plan for elevating Summer Street over the tracks of the New England Railroad, will soon occasion a flow of traffic and travel across that tract. From this elevation attention will be drawn to the attractiveness and value of the surrounding land for building purposes.

In January sales were consummated at satisfactory prices of two parcels of the Commonwealth's land lying between

Summer and Fargo streets, easterly of C Street and westerly of E Street, at its junction with Summer Street, comprising in all 304,521 square feet, for the sum of \$437,968.90.

These lots have been purchased with a view to improvement when Summer Street shall be opened to public travel. It was part of the understanding with the purchasers of these lots that Fargo Street should be finished for travel and use at an early day.

In March another parcel, of 10,500 square feet, bounding on B and Anchor streets, near the southerly boundary of the Commonwealth's land, was sold for the sum of \$6,300.

In November 74,970 square feet of land, lying between E Street and the Reserved Channel, together with the flats in front thereof and a pile wharf built by the Commonwealth, was leased * to Charles Taft Chapin for a coal wharf, for the term of fifteen years from May 1, 1900, at a yearly rental of \$4,000.

THE COMMONWEALTH PIER.

The core or solid portion of the Commonwealth pier, described in prior reports, is now completed, 300 feet wide and 1,150 feet long. The outer walls of the structure are of granite blocks, resting on a foundation of piles driven below extreme low-water mark. This increases the solid land of the Commonwealth about 8 acres. The material for filling between these walls, excepting the grout and gravel placed immediately adjacent thereto, was excavated from the docks adjoining. Owing to the semi-liquid character of the filling material dredged from the dock on the westerly side of the pier, it became desirable, as the various layers were deposited, that more time for drying out should be given before another layer was deposited. For this reason, when the sea walls and other work had been completed, certain small areas had not been fully filled to grade. It was thought best to leave these areas for the present, and to complete the filling during the coming winter and spring with the material from cellar excavations and other sources, as that is constantly brought to the Commonwealth's property for a dump. This work is now progressing. A coat-

* See Appendix C.

ing of this same dry filling is being spread over the other portions of the pier, forming a roadway and levelling up the depressions where the clay filling has unequally settled. In excavating the material used for filling the pier, the dock on the westerly side has been dredged to the depth of 30 feet at mean low water throughout its whole width on the Commonwealth's property from the harbor line to a point 450 feet up the dock. The balance of the distance to the head of the dock has been excavated to the same depth for a width of 100 feet adjoining the face of the proposed platform. On the easterly side of the pier only sufficient dredging was done to provide for the construction of the sea wall and platform. At the outer end of the pier the harbor has been dredged to the depth of 30 feet at mean low water for a width of 70 feet outside the harbor line. Between that and the ship channel, a distance of about 1,080 feet, previous excavations had been made to the depth of 23 feet at mean low water. The material which is to be removed from the balance of the dock on the westerly side, as well as a portion of that which was taken from the dock on the easterly side, will have to be carried to sea.

During the winter of 1898-99 plans and specifications were prepared for the oak pile platform which is to cover the outer slope of the foundation of the sea wall of the pier, and form the face of the wharf. This is to consist of large oak piles, spaced about 8 by 6 feet, and so driven that a dock can be dug and maintained 40 feet below mean low water whenever required. The floor of the platform is to be built of Georgia pine. The outer corners are to be heavily braced with timber. The belay posts are to be of cast iron, securely bolted to the framing of the wharf, and to be of a size and shape best calculated to hold the mooring lines without interference with the discharging of vessels.

The contract * for the platform was awarded to the lowest bidder, George A. Cahill, March 6, 1899, and requires the whole work to be completed July 1, 1900.

When completed, the Commonwealth will have the largest pier on the Atlantic coast, having an area of about 11 acres,

* See Appendix A.

with docks adjacent, 1,200 feet long, excavated to a depth of 30 feet at mean low water, which may be increased to 40 feet, if desired, without danger of undermining the adjacent pier.

CONGRESS STREET.

Congress Street was almost impassable when the filling for elevating Summer Street was being deposited, and it became the duty of the Board to supply a new thoroughfare. As a portion of Fargo Street was to be laid out and paved as part of the project in substitution of Congress Street, under a decree of the court, the Board availed itself of the opportunity to complete the remainder of Fargo Street at the same time, under one contract * for the entire street, and thus make a saving in the cost to the Commonwealth. Plans and specifications were prepared for paving with granite blocks 1,600 feet of Fargo Street, 50 feet wide, and that portion of E Street connecting it with Summer Street extension, 560 feet long and 60 feet wide, and also for setting the granite edge-stones and cross-walks; also for building 17 catch-basins and about 3,000 feet of pipe drains, with the necessary man-holes and tide-gates as laid out and planned by the sewer department of Boston.

Since this work was finished, in October, the city of Boston has paved a portion of Congress Street, so that there is now a block-paved and thoroughly finished street, with the exception of brick sidewalks, across the Commonwealth's land from L Street bridge through Summer, E, Fargo and C streets to the junction of the latter with Congress Street. This has been accomplished with but little delay and inconvenience to the public, and at comparatively small cost to the Commonwealth. The total sum paid as its share for the foregoing, independent of its percentage of the cost of elevating Summer Street (to be ascertained only on its completion), is \$23,590.61, for grading, curbing, draining by storm-water sewers and catch-basins, and paving the street 50 feet wide. With the demand for the sale of lots, other streets in this locality will shortly need to be paved and put in order for public travel and use.

* See Appendix B.

SUMMER STREET.

Summer Street, under construction by the city and railroad, is progressing slowly, and it is said it will take another season before it will be ready to be opened. The abutments at B and C streets, where Summer Street crosses overhead, are completed, and the filling for elevating the street and the ramps approaching thereto is substantially in place. It will be some time yet, however, before the bridge work across the tracks of the New England Railroad, now under way, will be set in position.

NORTHERN AVENUE.

In previous reports the Board set forth the necessity of building Northern Avenue and Northern Avenue bridge, as essential to the most useful development of the Commonwealth's property at South Boston. The proposed avenue and bridge are shown on a plan annexed to the report for the year 1896, and therein, on page 7, it is said: "It shows the avenue on the Commonwealth's lands at a width of 150 feet, as being the proper width, in the light of modern requirements, for an avenue at the head of wharves of the proposed class. The proposed Northern Avenue will necessarily be at grade with the railroad tracks. Its purposes are to supply additional conveniences for delivering and shipping merchandise at the proposed docks and wharves by both rail-haul and truckage, and to afford more direct and shorter communication at grade with the business centres of the city and with connecting railroads. Its use would naturally be confined to heavy teaming and railroad transportation, such as is connected with loading and discharging steamships."

The pressing necessity for another bridge across Fort Point Channel is urged again in the report for the year 1897, page 9, where the condition of Congress Street bridge is referred to, and the statement made that before long it will have to be closed to public travel for repairs.

Again, in the report for the year 1898, the value of this bridge to the property of the Commonwealth at South Boston is fully set forth. It is there stated that Northern

Avenue and bridge were projected as early as 1866 by some of our wisest citizens; that in 1873 an agreement, to which the Commonwealth, the Boston & Albany Railroad Company, the Boston Wharf Company and the city of Boston were parties, made provision for building it as part of the plan for filling and developing the flats. The essential relationship it would bear to a proper development and use of this property was then foreseen. The Commonwealth is about completing the expenditure of nearly \$400,000 in building a pier of great size with deep-water accommodations in the adjacent docks for the largest-sized steamships. Transportation between this dock, railroad terminals and the centres of the city must be at grade, and by the shortest and most direct routes. Had the construction of this avenue and bridge been assured, the Board feels confident that a lease of the entire pier could have been contracted for before its completion.

Repairs on the Congress Street bridge cannot be long delayed after opening Summer Street extension to public travel. These repairs will have to be extensive, and will include a widening of the draw-opening for the passage of steamships, which now are discharged in mid-stream and their cargoes of sugar delivered in lighters to the warehouses above the bridge.

A long time will elapse during which public travel will be shut off from this bridge. The new Summer Street, elevated above the surrounding level, is not equally convenient of access, and would impose the additional burden of hauling every load up 10.5 feet to get across the bridge. Under these conditions, it would seem most opportune for the Commonwealth to unite with the city and the railroad in laying out and constructing Northern Avenue and bridge, and the Board recommends the enactment of the necessary legislation.

THE COMMONWEALTH FLATS AT EAST BOSTON.

In its last annual report the Board related its taking in the name and on behalf of the Commonwealth of the flats lying on the easterly side of East Boston, between Jeffries Point and Wood Island Park, and bounding easterly on the United States pierhead line, being a strip 1,500 feet in width, taken

under the provisions of chapter 486 of the Acts of 1897. It has during the year settled some of the claims for the best portions of the flats taken, at the rate of $2\frac{1}{2}$ cents a square foot, which is the same rate as for those settled the previous year. The largest claim, however, is that of the East Boston Company, which will have to be determined by a jury in the superior court, and is now in the hands of the Attorney-General.

It is the duty of the Board to emphasize what it has before said, that the value of the flats taken lies in their development in connection with railroad terminals.

The great growth of exports from the port warrants the belief that all the water front available for the approach of trans-atlantic steamships and at the same time accessible to the railroads will be wanted before long, and therefore plans should be carefully matured ready for development whenever the Legislature shall see fit to make an appropriation for the purpose. The State Board on Docks and Terminal Facilities, 1896, on pages 95, 96 of its report to the Legislature, made certain recommendations, advising a change of location of railroad tracks in East Boston. These recommendations were based on a communication of its engineer, Thomas Doane (see pages 136, 137 of the above-named report), than whom no engineer living had a clearer vision or better grasp of the problem of mutual or common railroad terminal interests and possibilities in and around Boston. They also had the approval of the accomplished engineer of the city of Boston, William Jackson, and were advocated in the public interest by the mayor of Boston in 1897 and subsequently. They involve the surrender by the Boston, Revere Beach & Lynn Railroad of its location between its East Boston ferry slip and Trumbull Street to the Boston & Albany Railroad and the Boston & Maine Railroad, and the surrender of the locations of the two last-named railroads from the junction of Bennington and Trumbull streets south to Marginal Street. Also they contemplate the acquisition of the last-named locations by the city of Boston for a boulevard, and the granting of the Boston, Revere Beach & Lynn Railroad a location thereon, upon its adopting the use of electricity for motive power. The ferry in con-

nection with this railroad could be run from the South Ferry at Lewis Street to Rowes wharf, its present landing, and thus better accommodate its passengers than at present by giving them the use of two ferries.

The arrangement above outlined is generally admitted to be of great public advantage.

A single glance at the map shows the increased water front areas which would be served by such a change. It would locate the tracks of the two great railroads near to the rear boundary of the Commonwealth flats, which have a frontage on the pierhead line of about 4,000 feet, with a depth of 1,500 feet, and include about 100 acres. This dedication by the Commonwealth of another large section of water front to the growing demands of commerce is a sagacious realization of opportunity; but it needs to be followed up by legislation requiring the foregoing changes to be made, in order to reap the advantages offered by the situation; otherwise the improvement of the territory acquired, by preparing it for the cheap handling of merchandise and products of all kinds in transit from railroad cars to vessels' bottoms and *vice versa*, would be liable to be visionary and profitless. Should the proposed change be made, it would become necessary to dredge a ship channel from the water front of the newly acquired flats to deep water, of a depth sufficient for the largest steamships now using this port, and for that purpose the Board would recommend not less than 35 to 40 feet.

There are various ways in which the East Boston acquisition might be advantageously handled. All plans therefor would necessarily include deep-channel approaches. The Board has several studies under consideration, but, until the location of the tracks of the railroads is settled, and while the determination of damages for the taking is pending, it is obviously unadvisable to promulgate a matured project. In any plan of development, however, a sea wall or bulkhead would first be required.

BOSTON HARBOR.

The port of Boston is of more value than all others to the Commonwealth, and within a territory of 12 miles from the State House more than a third of the population of the State is congregated and more than one-half of her wealth is massed.

The population of the State of Massachusetts, by the census of 1895, was 2,500,183, of whom there were residing within a circuit of 12 miles of the State House 1,004,424, or 40.17 per cent. of the whole. The valuation of the whole State, as assessed May 1, 1898, was \$2,894,436,611, of which amount \$1,697,177,290, or nearly 60 per cent. of the whole, lies within the area above named.

The size of ocean steamships within the past fifteen years has trebled, and now the deepest draught vessels steaming out of the harbor, if loaded to the limit of the summer load line, would draw about 32 feet. The increasing draught of the steamships has advanced more rapidly than the harbor channels, and the problem of deepening them sufficiently to provide navigable water has assumed serious proportions and demands prompt solution.

The federal government has been working for a series of years upon its project of August, 1892, for enlarging the main ship channel to the width of 1,000 feet and the depth of 27 feet at mean low water. All dredging between President Roads and Boston Light or Point Allerton, in what is known as the lower ship channel, has been completed. The channel is of full depth for about 800 feet, the remaining 200 feet being obstructed by ledges. These are now being surveyed, and a contract will probably be made at an early day for their removal next summer.

The upper channel from President Roads north is now being dredged, with the expectation that by June next it may have a depth of 27 feet for a width of 500 feet, as far as the inner anchorage. In the mean time, by reason of the increasing draught of the steamships coming to the port, the provisions of the project have become inadequate before their consummation.

This Board has repeatedly called attention to the inadequacy of the harbor channels, and can do no better than to quote a paragraph from its annual report for 1895, page 12, as follows:—

It seems to the Board that the time has come for considering the much-needed improvements in Boston harbor in a broad and comprehensive way. The federal government is at work on its project of deepening and widening the main ship channel, so as to obtain

27 feet at mean low water and 1,000 feet in width up opposite to Constitution Wharf. But since this work has been entered upon the draught of the largest vessels which now sail to and from this port has increased several feet, and their carrying capacity has doubled.

Under these circumstances, the question as to what is to be done to maintain Boston as a first-class port becomes imperative. A careful study of the map gives an adequate solution. Broad Sound Channel, on leaving President Roads, is obstructed between Deer and Green islands and for some distance outside by shoals, and by sundry rocks and ledges beyond. It is thought that an expenditure of from one-half to three-quarters of a million dollars will remove all obstructions and give a fair way from the bay into President Roads, 30 feet deep at mean low water and several thousand feet wide. This would ensure an adequate approach to the harbor in a straight course for all time to come. But beyond this, in the interest of economy of time and despatch, without which the sharp competition of the present day cannot be met, vessels of the largest size should be enabled to steam to their berths without delay in waiting for the turn of the tide. To this end is required a channel of varying but sufficient width from President Roads to the railroad terminals, with a depth of 30 feet at mean low water. These two requirements are essential to enable Boston to provide adequate accommodation for the growing demands of her commerce.

Four years have passed since making that report, during which time a survey and estimate of cost for excavating a channel 1,200 feet wide and 30 feet deep through Broad Sound have been made, and Congress has authorized the completion of the project at a cost not to exceed \$450,000, and has appropriated \$5,000 to begin with. Proposals have been advertised for the contract, but as yet the lowest bid is in excess of the sum authorized. Such, however, has been the rapidity of increase in the draught of vessels, that 30 feet is no longer adequate, and 35 feet is now recommended for the minimum depth of all main harbor channels.

It is of vital importance that every possible effort should be made to secure a channel from the Navy Yard to the sea, of a minimum width of 1,200 feet and a minimum depth of 35 feet; and until that shall be accomplished, the largest steamships cannot be loaded with export cargoes to their full capacity and depart at any time of the tide with entire safety.

These reasons, among others, demonstrate the necessity for action in the direction of improving the facilities for navigating large vessels into and out of the harbor of Boston; and the action should be immediate, in order that we may not be behind the more southern Atlantic ports in our ability to accommodate the largest class of deep-draught steamships. If early action cannot be had by Congress on this matter of vital importance to the growing commerce of this port, then it naturally becomes a question of moment to be considered by the Legislature. To turn the tide of commerce away from us just as it has begun to set strongly in our direction, by the failure to provide accommodations that may be found elsewhere, might be to turn adrift what could not subsequently be brought back. For a period of nearly a generation now the exports and imports have been growing, until they reached in 1899 the figure of \$190,561,119, of which \$127,133,043 were exports and \$63,428,076 were imports. The regular and frequent sailings of steamships to-day have greatly encouraged importations through this port, and the rates have become more favorable with the growth of business. The opportunity thus afforded to the manufacturers, within easy reach, for the export of their manufactured products, cannot readily be over-estimated. Every effort should be made by this community to encourage this growth, and nothing can conduce more to that end than the provision of broad and deep waterways for the safe ingress and egress of the great trans-atlantic liners.

The importance of these considerations has been urged in the last three annual reports * of this Board, and, in the interest of the whole Commonwealth, the views therein set forth cannot be too frequently or urgently reiterated.

The great contest for the carriage and shipment of western export products is just beginning. The opening of the all-Canadian waterways to the sea, shortly to be completed, will stimulate the exports through Montreal. The improving conditions at Philadelphia and the cheap freights by the way of Baltimore and Newport News will continue to attract traffic *via* those ports. The traffic interests between the

* Report, 1896, pages 11-17; 1897, pages 16, 17; 1898, pages 16, 17.

north-west and the gulf ports will exert tremendous efforts in competition with the east and west trunk lines to secure the products of the interior for shipment *via* their terminal ports. Amid these warring interests, the true course for the Commonwealth is to do all in its power to assist in procuring for Boston wide and deep waterways. These attract the steamships and lessen risks of navigation. Add thereto the advantage of being the nearest great Atlantic seaport by 180 miles to the English Channel, and we are in a position to hold our own in the competition of the future as in the past, and keep on steadily increasing the volume and value of both exports and imports.

Boston lies at the gateway of the great north-western territory both of the United States and Canada. In summer the St. Lawrence River is the natural pathway for as much north-western grain and as many cattle as the facilities afforded at Montreal can accommodate, but which should find a winter port at Boston.

The ports of St. John, New Brunswick and Portland compete for their share of grain at all seasons, but the superior advantages of a port of large imports as well as exports lie with Boston.

The coastwise, West Indian and South and Central American commerce is steadily increasing, so that, taking all the demands of shipping together, the wharf accommodations of Boston have during this past year proved insufficient. If proper provision is to be made for the growth of maritime commerce in the future, it will be necessary to forward measures already in the hands of the Board, such as perfecting the accommodations for reaching the Commonwealth pier, improving the newly acquired water front at East Boston, and enlarging the anchorage grounds in the upper harbor; or, in lieu of the latter, providing some facilities for caring for vessels before they are able to go to their respective piers.

ANCHORAGE.

The federal government is dredging the main channel from the sea through the inner harbor, and many shipping merchants are of opinion that the Commonwealth should provide

such additional facilities as may be needed outside of the main channel.

A scheme has been advocated, by persons familiar with the requirements of Boston harbor, in favor of dredging Bird Island flats to sufficient depth to secure anchorage accommodations. A study of this problem has been made by the Harbor and Land Commissioners, and the Board believes that the cost to the Commonwealth of the dredging would be too great to be warranted in view of the accommodations thereby furnished. In the opinion of the Board, structures might be built on the southerly side of these flats, which, with a comparatively small amount of dredging, would furnish accommodations for a much larger number of vessels than could ever be safely anchored on the area that would be made available by the total removal of the shoal.

It is recommended that authority be given for a survey and investigation of this project.

DREDGING BY THE COMMONWEALTH.

During the spring the Winthrop Steamboat Company notified the Board that the channel leading to their wharf at Winthrop had shoaled to such an extent that it was difficult for their boats to reach the wharf at low water. A contract was therefore made, May 4, 1899, with the Bay State Dredging Company, to excavate the channel 50 feet wide and 8 feet deep at mean low water. The work was completed June 3, 1899, 5,831 cubic yards of material having been removed, at a total cost of \$1,632.68.

CHARLESTOWN NAVY YARD.

Great improvements are projected at the Navy Yard, some of which are now being carried out. Although they are wholly under federal authority, they are, nevertheless, of considerable interest to the Commonwealth and to the port of Boston.

Under the provisions of an act of Congress, passed this last session, a large wet dock, 570 feet long by 160 feet wide, between the westerly end of the Navy Yard and the easternmost Hoosac Tunnel pier, is under construction. Ac-

commodation will be furnished at this dock for coaling the largest war vessels alongside the pier; also a new berth will be supplied to the Fitchburg Railroad, well adapted for the convenience of trans-atlantic steamships. This is expected to be completed next September.

The government is also constructing a large stone dry dock, to be located just east of the present dry dock. Its length on the coping over the head to the outer gate sill will be 750 feet, and its width at the entrance on mean high-water level will be 100 feet, with a draught over the sill of 30 feet. This will give an opportunity, in case of need, for docking merchant steamships of the largest class that come to this port.

The project further embraces the extension of wharves numbered 2, 4, 5 and 6 to the new pier and bulkhead line, and includes the widening and lengthening of the docks or slips leading to the old and new dry docks. It is proposed eventually to protect the entire water front by a concrete-faced quay wall, and to dredge to a uniform depth of at least 30 feet at mean low water in front thereof.

All these improvements require time and suitable appropriations from Congress for their completion. They are made possible by the provisions of chapter 64 of the Acts of 1899, ceding certain of the Commonwealth's tide-water land, and jurisdiction over the same, to the United States, for the purpose of enlarging the Navy Yard.

FORT POINT CHANNEL.

The conditions in this channel have been bettered the past year by the removal of the bridge of the New England Railroad Company, the navigation through the lower channel thereby being much improved. The draw opening of the new Summer Street bridge is 50 feet in width, and the class of vessels used in commerce as far as Federal Street bridge will require, when Congress Street and Mount Washington Avenue bridges are rebuilt, that they have draw openings of the same capacity.

There is now no longer reason for delay in asking Congress to make the appropriations necessary to carry out the project recommended by Colonel Mansfield, referred to in

last year's report, page 12, for completing the improvements proposed in 1885, and subsequently carried out as far as Congress Street, and which was then estimated could be completed to Federal Street bridge for \$60,000.

The new drawbridge of the New York, New Haven & Hartford Railroad Company is a rolling lift bascule bridge, in three sections, each section carrying two tracks, and spanning the entire draw opening. It is operated by electricity, each section being entirely independent of the other. Owing to the sharp angle at which the railroad crosses the channel, the trusses are of unusual length, being 84.5 feet between bearings, and when lifted projecting about 130 feet above the bridge seats. The whole bridge rests on 7 stone piers, and is in every way a model structure.

SHIRLEY GUT.

The conditions at Shirley Gut awaken the serious apprehension of the Board. The United States Coast Survey charts of 1860 showed a channel of a minimum width of 240 feet between the banks at mean low water and depth of 20 feet. From surveys in 1871, 1881, 1893, 1895 and 1898, it appears that this channel has narrowed to a minimum width of 100 feet, and shoaled to a minimum depth of 8 feet. The contraction and shoaling are proceeding at a rate that by natural action alone, if left without interference, will in no great length of time close the channel to navigation. The use of the channel is increasing rather than diminishing. It lessens the distance for boats plying between Boston wharves and Lynn and Nahant. It is regarded generally as a valuable water way, and one that it would be inadvisable to permit to be closed to navigation.

SOUTH BAY.

In its annual report to the Legislature for the year 1890 the Board made the following statement: "There can be little question that it would be a public improvement to fill some portions of the bay and to deepen others," and legislation was recommended that should "remove any obstacles which the existing harbor lines present to the improvement

of the bay." In the following year a topographical survey of the bay was made and harbor lines established, together with provision for its sanitary improvement.

The exclusion of business occupants from the wharves on the west side of Fort Point Channel by the building of the Southern Terminal Station created a demand for wharves in the South Bay. The wish on the part of owners of land abutting in the bay to improve their property led to a careful estimate of the water area required in the bay to accommodate the commerce which might be calculated to follow the building of piers and docks around its shores.

The present harbor lines established by chapter 278 of the Acts of 1898 followed, and by authority of that act also the contract referred to as Appendix B in the report of the Board for 1898 was made. Proceedings were taken in the supreme judicial court to prevent action under that contract, and the law on which it was based was declared to be unconstitutional, as lacking in the provision for indemnification to parties injured by proceedings under it.

Under the provisions of chapter 469 of the Acts of 1899, which followed the decision of the court, a scheme or project for the improvement of the bay has been adopted, the plan whereof is on file in the office of the Board. Subsequently a taking * was made of that part of the bay nearest the wharves already in use, and best calculated to serve their convenience. A contract will shortly be made for excavating the flats taken to the depth of 12 feet at mean low water, and as rapidly as possible the improvement authorized by the statute for the purpose of improving navigation and the sanitary condition of the bay will proceed.

The value to the public of this interior water basin in bringing heavy and bulky materials at low cost nearer the place where they will be needed, and in saving the streets from the heavy teaming and incidental congestion by removing the same, is not easily over-estimated, and will become an obvious demonstration as the population of the city increases.

* See Appendix D.

COVE STREET BRIDGE.

Under chapter 466 of the Acts of 1899, the city of Boston petitioned the Board for approval of plans for building Cove Street bridge over Fort Point Channel. The hearing was well attended by those in favor and those opposed to the petition. The Board was asked to rule on the point as to whether the Board, under chapter 466 of the Acts of 1899, had authority to consider this matter in connection with the interests of navigation, and whether, if it found that said bridge if built according to plans submitted would seriously impede navigation, it could report the matter to the next General Court without approval of said plans. The Board thereupon ruled that the power of the Board is limited by the provisions of chapter 19, Public Statutes, particularly section 8, which provides that the Board may alter plans at its discretion, but may not diminish or control the legislative grant; and, as this is a grant of the Legislature, the Board is restricted to the approval of plans for the construction of this bridge in a manner which will cause the least obstruction to navigation, the Legislature having said that a bridge might be built in this location. Therefore the Board declined to go into the question and hear evidence as to the detriment to navigation which the building of this bridge in this locality would cause. The Board subsequently voted to approve the plans as submitted and to issue the desired license.

Subsequently the War Department disallowed the project of another bridge across the channel at this place; but the matter has been reopened and heard by a special board of army officers appointed for that purpose. As yet no decision has been rendered.

CHARLES RIVER.

The new bridge from Boston to Charlestown between Warren and Charles River bridges has been completed. The draw openings are 50 feet wide, and the draw itself weighs 1,100 tons. It was opened to public travel on Nov. 27, 1899. The old Charles River bridge is about to be removed, in compliance with the statute.

The old West Boston bridge from the foot of Cambridge Street in Boston to Main Street in Cambridge was closed, and the temporary wooden structure, built to take its place while the new bridge required by chapter 467 of the Acts of 1898 is building, was opened to public travel on Oct. 19, 1899.

The Metropolitan Park Commission has steadily progressed in its work on the south bank of the Charles, between Boylston Street and the Arsenal Street bridge. A large quantity of gravel and other material has been excavated from the river, for the purpose of surfacing up these banks and filling the marshes. The result of the dredging has been generally beneficial to navigation.

MYSTIC AND CHELSEA RIVERS.

During the past year great progress has been made towards completing the plant of the New England Gas and Coke Company, which occupies many acres of improved property bordering on the north side of Mystic River and the west side of Island End River, just above the Chelsea bridge. This great plant, which is expected to cost several millions, has not only raised the value of the marsh flats adjoining the river bank, but has attracted attention to the possibilities of their use and development. It is planned to widen the present draw in Chelsea bridge (north) over Mystic River, from 45 feet, its present width, to 60 feet, and also to widen and deepen the channel in Mystic River through and above the bridge. These improvements will facilitate the navigation of the river by larger vessels, and thus encourage a demand for wharf privileges in the neighborhood of the surrounding thickly settled and fast-growing communities.

With a view to the growth of the maritime commerce and requirements of the port, the Board has been forced to determine that the time has come to make some general regulations with respect to the plan of development of the shore property of these two rivers. If this action is taken seasonably, the mistake of allowing shore owners to cover their flats with structures for wharfing and other purposes, without regard to size or capacity of docks or convenience to shipping, may be avoided, and development may be guided

in a systematic way. We learn from the errors of other ports, both in this country and abroad, how, at great cost, made land has been excavated for docks, and encroachments into tide waters have been taken away to make convenient berths for the giant vessels of modern construction.

United States bulkhead and pierhead lines have been established by the Secretary of War on Mystic and Chelsea rivers. Filling is allowed as far out as the bulkhead line, and beyond only structures on piles are permitted to the pierhead line.

If each owner were granted a license to build a pile structure over his entire area, out as far as the pierhead line, all the dock space would be covered, and the berth room for vessels would be limited to the quayage front of the river bank. Within what number of decades the demand may arise for the use of more docks in these locations than would thus be afforded no man can say, but plans of the nature under consideration should be made with reference to the future, both immediate and remote. The Board has concluded it to be for the public interests to require that on all lots with a frontage of 100 feet or thereabouts on the river 50 feet in width should be reserved for a dock, and that no portion of that 50-foot-wide dock between the United States bulkhead and pierhead lines be encumbered by any structures. The full benefits of this plan may not be realized for years; but when the time arrives the necessity for rearrangement and the incidental costs would be spared, and the tendency to maintain a port of low charges preserved.

The pressing necessities of adequately providing for the rapidly increasing commerce of the port of Boston and also facilitating exports of the manufactures of the Commonwealth demand the conservation of the water front to its fullest extent, and its utilization to the utmost possible advantage. To these public rights it is unavoidable that private interests should yield, and submit to a proper regulation of their use.

CAPE COD CANAL.

The Boston, Cape Cod & New York Canal Company was chartered by chapter 448, Acts of 1899, to construct and operate a ship canal between Barnstable Bay and Buzzards

Bay, subject, in certain particulars, to the approval of the Board of Railroad Commissioners and the Board of Harbor and Land Commissioners, sitting jointly or separately, as and for the purposes in the act prescribed.

On June 14 a petition was received from the Canal Company for authority to issue stock and bonds. After due publication of notice, a hearing on the petition was given by the joint Board, at the office of the Railroad Commissioners, and the Canal Company was authorized to issue \$140,000 in stock and \$140,000 in bonds, as soon as a deposit of \$200,000 should be made with the Treasurer of the Commonwealth, to reimburse the company for the deposit so made, and to provide means for making the deposits and payments to the county of Barnstable and the towns of Bourne and Sandwich, as provided in said act, and for defraying the necessary costs incurred in making the surveys and plans for the location and construction of the canal, as authorized by its charter. A copy of the order is as follows : —

IN BOARD OF RAILROAD COMMISSIONERS AND HARBOR AND LAND COMMISSIONERS, SITTING AS A JOINT BOARD, JUNE 26, 1899.

In the matter of the petition of the Boston, Cape Cod & New York Canal Company for the approval by the said joint Board, under chapters 448 of the Acts of 1899 and 462 of the Acts of 1894, of an issue of capital stock by said company to the amount of \$6,000,000, and also of an issue of bonds by said company, to the amount of \$6,000,000, for the purpose of building and equipping a ship canal, and of defraying the cost and expense incident thereto, as set forth in said petition, —

It appearing, after public notice and hearing, that said company has been chartered by said chapter 448 of the Acts of 1899 for the purpose of constructing and maintaining a ship canal extending from Buzzards Bay to Cape Cod or Barnstable Bay, through the towns of Bourne and Sandwich, or either of them, with a required capital stock of \$6,000,000, and with authority also to issue bonds not to exceed its capital stock at the time actually paid in ; and

It being deemed by the said joint Board that an issue of capital stock and an issue of bonds by said company to an amount not to exceed \$6,000,000 each, to be issued from time to time as here-

inafter provided, may be reasonably requisite for the purposes for which such issues have been authorized as aforesaid, it is —

Ordered, That the said joint Board approve an issue by the said Boston, Cape Cod & New York Canal Company, subject to the provisions of all general and special laws applicable to such issue, of not to exceed in the whole 60,000 shares of its capital stock, amounting at the par value thereof to \$6,000,000, and of not to exceed in the whole at the par value thereof \$6,000,000 of its bonds, payable at periods not exceeding fifty years from the date thereof, with interest at a rate not to exceed 6 per cent. per annum, and secured by a mortgage of its franchise, canal, equipment and all of its property, real and personal; the said stock and bonds, or the proceeds thereof, to be applied to the purposes set forth and specified in said chapter 448 of the Acts of 1899, and to no other purpose; and the issues of the said stock and bonds to be made in the manner and upon the terms and conditions following, and not otherwise: —

1. The capital stock of said company shall be duly subscribed, and said company shall be duly organized, and its corporate organization shall be duly maintained, as regards the choice of officers and otherwise, in the manner provided in the general laws of this Commonwealth relating to railroad corporations. It shall have its office and hold its meetings in this Commonwealth; and its books, records and contracts shall be submitted to said joint Board whenever requested by it for examination.

2. No shares of stock or bonds shall be issued except upon payment of the par value thereof in cash, or in payment for labor performed and material furnished in construction, or in payment for property acquired, or to provide means for funding its floating debt, or for the payment of money borrowed for any lawful purpose, as authorized by said chapter 448 of the Acts of 1899.

3. All certificates of stock and all bonds of said company shall be certified and issued only by and through the New England Trust Company of Boston, or some other Massachusetts trust company approved by said joint Board, under an indenture of trust of which the terms and conditions have been also so approved; and the same trust company shall be made the trustee in the mortgage securing the bonds.

4. Upon the due authorization by votes of the stockholders of said Canal Company of issues of its capital stock and mortgage bonds to the amounts aforesaid, and upon the due execution and delivery of such indenture of trust and mortgage, said Canal Company may execute and deliver to such trust company its certificates

of stock and mortgage bonds to an amount not exceeding at par \$6,000,000 each; but the said certificates of stock and bonds shall be certified and issued by such trust company only as follows: —

(1) Stock to the amount of \$140,000, and bonds to a like amount, shall be certified and issued to said Canal Company or its order, as soon as a deposit of \$200,000 has been made by said Canal Company with the Treasurer of the Commonwealth, in accordance with the provisions of section 23 of said chapter 448 of the Acts of 1899; the said stock and bonds, or the proceeds thereof, to be applied to the following purposes and to no other, namely: to reimburse the company for the deposit made as aforesaid, to provide means for making the deposits and payments required by sections 14 and 20 of said chapter 448, and to defraying the necessary cost incurred in making surveys and plans for the location and construction of the canal authorized by said chapter.

(2) Said trust company may certify and issue in like manner such further amounts of stock and bonds, not to exceed in the aggregate (including the issues above mentioned) \$6,000,000 each, as from time to time, on the application of said Canal Company, shall have been approved and certified by said joint Board, in the manner provided in chapter 462 of the Acts of 1894, as reasonably requisite to enable said Canal Company, promptly and in good faith, to carry out the purposes set forth and specified in said chapter 448 of the Acts of 1899: *provided*, that the total amount of bonds so approved, certified and issued shall at no time exceed the total amount of capital stock then actually paid in and outstanding as aforesaid.

JOHN E. SANFORD,
GEORGE W. BISHOP,
HERSEY B. GOODWIN,
Railroad Commissioners.

WOODWARD EMERY,
CLINTON WHITE,
Harbor and Land Commissioners.

Later an application was made to the joint Board to modify the order, and permit the issue of the total amount authorized by the charter, to wit, \$6,000,000 in stock and \$6,000,000 in bonds; provided, that such total issue should be placed in the hands of a trust company, there to remain intact until the canal was completed to the satisfaction of the Board. The desired modification was refused, on the ground that the requirements of approval and certification of the joint Board

were limited by the provisions of chapter 462 of the Acts of 1894, which read as follows: "shall hereafter issue only such amounts of stock and bonds as may from time to time, upon investigation by the board . . . be deemed and be voted by them to be reasonably requisite for the purposes for which such issue of stock or bonds has been authorized."

On September 28 the Canal Company deposited \$200,000 with the Treasurer of the Commonwealth, and filed with the Harbor and Land Commissioners plans of the proposed location and of the proposed construction of the canal, as required by its charter. After due notice a hearing was given on November 28 to the parties interested, that being as early as the representatives of the Canal Company could conveniently attend, and the hearing was continued to December 19, at the request of the Canal Company, to await the return of its engineers, who were still absent.

BOAT HARBORS.

The policy of providing boat harbors where the call for them is such as to justify their cost continues to find favor with the public. The direct advantage from the increased attractiveness of a seashore place that furnishes a good harbor for boating is obvious, and the attraction of those now built and in process of building has already created a demand for them elsewhere. The Board wishes to emphasize the fact that these boat harbors on the sandy shores of the coast are still more or less of an experiment, and it would be wise to suffer a sufficient time to elapse to test the work of the Board, and to furnish data for making changes, if necessary, before progressing far in this direction. Every application should receive the severest scrutiny; and, owing to the unavoidable uncertainties connected with every project of this kind, none should be undertaken without first securing such information as can be obtained from a careful survey and estimate of the cost.

GREEN HARBOR.

Previous to 1871 the harbor was formed by the lower portion of Green Harbor River, a small stream in the southeasterly portion of the town of Marshfield, with a water-shed

of about $7\frac{1}{2}$ square miles, 1,500 acres of this being salt marsh lying next to the banks of the river. It empties into the ocean through a sand beach at its northerly end, where it joins the upland. The outlet is so protected on its north-easterly side by rocks and ledge that it appears to have no tendency to move along the beach. Up to 1871 the harbor was said to have a depth of about 14 feet, while over the bar there was about 2 feet at mean low water. In 1872 a dike, authorized by chapter 303 of the Acts of 1871, was built about one-half mile above the mouth of the river, which greatly reduced the volume of the tides and the rapidity of their ebb and flow. As a result, the sand was gradually driven into the harbor below the dike, practically filling it up, and leaving only a narrow channel, whose bottom was above the level of low water along its northerly and easterly sides. An appropriation of \$67,000 was made by chapter 469 of the Acts of 1898 for the improvement of this harbor, and plans and specifications were prepared for the work. These provided for two stone jetties, one on either side of the outlet, with an opening of about 200 feet between their outer ends. The jetties consist of large, irregular-shaped blocks of granite, the blocks being deposited from the vessels and allowed to make their own beds, the outer ends of the most exposed portions having a side slope of 2 to 1, the faces next the channel having a side slope of 1 to 1, and all other portions $1\frac{1}{2}$ to 1, the main portion of the jetties being built up 2 feet above mean high-water mark, with a width of 5 feet on top, the outer ends carried 4 feet higher, to serve as beacons at the entrance.

The jetties were completed early in the fall, at a cost of \$33,256.93 and already the tidal currents have scoured out the sand from a portion of the channel, depositing it near the outer ends of the jetties, increasing the navigable depth, but forcing the low-water line a little farther out to sea.

During the summer plans and specifications were prepared for building a timber training wall to deflect the current from Cut River, so that it should pass out directly through the Narrows, instead of running across the harbor and obstructing the flow in the channel of the main river. A contract for the construction of this work was made with Augustus

Bellevue & Co., Oct. 16, 1899. Owing to delay in completing the jetties, it is deemed advisable not to make any contract for the dredging of the channel and anchorage basin until next spring, in order that opportunity be given to study the changes which may occur through natural causes during the fall and winter. The channel between the Narrows and the sea has been deepened by the scour of the current, and it is anticipated that the changes which are occurring will facilitate the work of dredging to be undertaken later, when it is proposed to excavate a portion of the sand from the interior of the harbor for the purpose of an anchorage for boats, and to excavate a channel from this basin out between the jetties to a depth of 4 feet at mean low water.

So far, results are satisfactory and in accordance with the anticipations of the Board.

LAKE ANTHONY.

Under the appropriations authorized by chapter 441 of the Acts of 1898 and chapter 155 of the Acts of 1899 for the improvement of this harbor, plans and specifications were prepared for dredging a channel through the beach into the lake 100 feet wide on the bottom, with a depth of 5 feet at mean low water; the sides of the cut sloping up on an angle of 5 to 1; the entrance to be protected by two stone jetties extending from the top of the beach into the sound about 200 feet beyond the low-water line, reaching a depth of about 8 feet at mean low water. These jetties are built of granite quarry grout, and are 5 feet wide on top, 5 feet above mean low water, with sides sloping 1 to 1 next to the channel and $1\frac{1}{2}$ to 1 on the exposed face; the slopes of the outer ends are on an angle of 2 to 1, the top being 10 feet in diameter at the level of the main jetty, and built up above this, with vertical sides, to a height of 4 feet, to serve as a beacon or day mark at the outer ends.

The contract for the stone work was awarded July 5, 1899, to Eugene S. Belden of Hartford, Conn., the lowest bidder, for \$2.23 per ton. Work was at once commenced, but, owing to the weather, was not finally completed until November, 1899. There were placed in the structure 5,858 tons

of stone, at a total cost of \$13,063.34. A contract was made with the Bay State Dredging Company to excavate the channel for the sum of \$6,000. Work commenced at once, and was completed in a satisfactory manner Oct. 24, 1899. The material excavated consisted of fine gravel and sand, and was deposited on the beach on both sides of the channel, raising the level of the beach so as to form a ridge too high for any waves to break over, thus forming a protection to the harbor. All the work contemplated by the plans has now been completed, at a total cost, including surveys and engineering, of \$19,627.13. The channel has a depth of not less than 5 feet at mean low water throughout its length and a width of 100 feet on the bottom. The current is sufficient to prevent seaweed and other materials from lodging there, but is not strong enough to interfere with boats beating in and out in a fair sailing breeze.

Already this place has served as a harbor of refuge for a schooner drawing 6 feet, and a pier and boat landing has been licensed, with a view to next season's enjoyment of the new and increased facilities for pleasure boating.

OSTERVILLE.

Work under the contract with George H. Cavanagh has been prosecuted steadily, with the exception of a short time when the bay was frozen over. The timber jetties were completed in August, and the excavation of the channel has progressed to such an extent that it was used for the passage of boats during the summer season. At the present time the larger part of the channel has been excavated, and there is now nearly as great a depth of water through this channel as there is over the bar at the entrance to Cotuit harbor. Owing to the necessity for making some changes in the dredging plant, work has been discontinued until next spring, but it is expected that the channel will be navigable to its full width before the yachting season opens.

It was deemed advisable to strengthen the outer end of the jetties with stone riprap, and this was done during November. Three hundred and twenty-three tons of stone were deposited, at a total cost of \$969.

Careful watch must be kept of the action of worms on the

timber work, and the jetties should be reinforced with stone before the timber is so weakened as to be liable to destruction from heavy waves.

MENAMSHA.

An additional appropriation having been made by the Legislature for strengthening the timber jetties at Menamsha Inlet, where they mark the boundary line between the towns of Gay Head and Chilmark, plans and specifications were prepared early in the spring for that purpose. The contract for the work was awarded May 11, 1899, to Eugene S. Belden of Hartford, Conn., the lowest bidder, for \$2.33 per ton. Work commenced at once, and was completed by July 3, 1899, 2,110 tons of stone having been placed in the jetties, at a total cost of \$4,916.30.

The jetties as now built have forced the current in the inlet to run nearly at right angles with the shore, instead of nearly parallel to it at the outlet, thus scouring out a navigable channel between the jetties having a depth of not less than 2.5 feet at mean low water for a width of over 30 feet. There is greater depth here than is found in the channel above between the entrance and the wharf, and such as will allow nearly all boats which are used in that vicinity to enter the harbor far enough to be in safety at all stages of the tide, although some of them cannot at low water reach the landing places.

SCORTON HARBOR.

The great storm of November, 1898, added to the work done under last year's contract, widening the cut, but not materially deepening it, except at the inner end, where the banks consisted of salt marsh which is not readily eroded; there the current has materially deepened the cut. Since then the action of the tides has gradually washed out the accumulation of mud in the main river and creeks through the marsh, increasing their navigable depth. This material has in all probability been washed out into the ocean, as no traces can be found on the marshes. At the present time the harbor is used by fishermen and lobstermen, but they can enter and leave only when the water is above the level of half-tide. The marshes and cranberry bogs have been thoroughly drained.

During the past year sand has begun to accumulate on the westerly side of the outlet, and is gradually forcing the mouth of the river to the eastward, and in all probability will eventually drive it back into its old position, so that its lower reaches will run parallel with the shore, with the sand ridge lying between it and the ocean; but it will probably be a generation or two before it will reach the situation in which it was found in 1897.

SURVEYS.

The amount of work done by the engineering force has been much larger in the past year than for a long time. Three additional assistants and two additional inspectors have been employed throughout the summer, and one of the assistants is still engaged. Almost the whole force has been employed in connection with the construction of the Commonwealth pier, the paving of Fargo Street and other work on the South Boston flats; also in connection with the construction and improvement of the various boat harbors for which appropriations were made by the Legislature, and on surveys of other harbors under special acts. Accordingly no progress was made during the year on the re-survey of the Mystic River, which has been progressing slowly for the last few years. This work should be pushed forward more rapidly the coming year, as the plans are required for the use of the Board.

Inquiries made at the office as to the location of harbor lines, depth of water in various places, location of structures, and for other information which is found in the archives of the Board, are increasing, and take up much valuable time.

The following surveys have been made during the year:—

February 28, survey of the fronts of the buildings on the north side of Boylston Street, near Berkeley Street on the Back Bay, in Boston, to determine to what extent projections had been made in violation of restrictions in the deeds of the property from the Commonwealth.

March 13 to 31, soundings were taken over the portion of South Bay east of the New England Railroad and north of Swett Street.

May 8 and 9, survey at Winthrop, to locate the lines of the

channel which was to be excavated under contract with the Bay State Dredging Company.

April 15, survey of wharf at 400 Atlantic Avenue, with soundings, to determine the amount of tide water which the owners proposed to displace in making improvements.

June 10, survey of a portion of Lincoln wharf in Boston, with soundings, to determine the amount of tide water which the Boston Elevated Railway Company proposed to displace in constructing its new power station.

July 8 to 15, survey of the new mouth of North River in Scituate, which was created by the great storm of November, 1898.

July 24 to 29, survey of a portion of Green Harbor River, below the dike, to determine the changes which had taken place during the construction of the jetties at its mouth.

July 31, soundings in South Bay, to determine the extent of the channel which had been dredged in front of the wharves of the Roxbury Central Wharf Company.

August 25 and 26, survey at Green Harbor, to mark the location of the training wall to be built at the mouth of Cut River, and to locate the lot of land owned by the Commonwealth at the inner end of the western jetty.

October 14 to 20, survey and soundings at Osterville, to locate channel which had been dredged by George H. Cavanagh under his contract with the Commonwealth.

November 8, survey and soundings of the channel at the entrance to Menamsha Inlet, on the boundary line between the towns of Gay Head and Chilmark.

November 9 and 10, surveys and soundings of the channel which has been excavated at Cottage City between Lake Anthony and Nantucket Sound.

November 27 to 29, survey to locate the harbor line on the wharves which have been built on the north-westerly side of East Boston.

The results of the surveys have been recorded on suitable plans, and the data thereby furnished has been used in preparing plans and estimates required by the Board.

Numerous examinations have been made from time to time of structures built under licenses from the Board, and

calculations made of the amount of tide water displaced by the same, as a basis for the compensation charge under chapter 19 of the Public Statutes.

WITCHMERE HARBOR.

By chapter 96 of the Resolves of 1899, the Board was directed to make surveys and prepare estimates for improving the entrance of Witchmere harbor in Harwich, Lewis Bay in Barnstable and Yarmouth, and East Bay in Barnstable, and a special appropriation of \$1,500 was made for this purpose.

In June a survey was made of Witchmere harbor. A plane-table survey was made of the shore lines of the harbor and its surroundings, together with the shore of Nantucket Sound, for a distance of about 1,100 feet on either side of the entrance to the harbor. Soundings were taken over the whole area of the harbor and its entrance channel, and in the sound on both sides of the entrance and extending out about 2,000 feet from the shore. The harbor proper consists of a pond, having an area of about 13.5 acres, and is nearly circular in shape. This is connected with the sound by a channel about 30 to 40 feet wide and 700 feet long, having a navigable depth of about 1 foot at mean low water. At the entrance the tide has a mean range of about 3.5 feet. During the past ten or fifteen years the local authorities have spent considerable sums in straightening and deepening the entrance channel and protecting its mouth by stone and wooden jetties. From statements of the selectmen and others it was learned that this harbor is the home port for the boats used as tenders for the lightships stationed on the shoals near Monomoy, as it is the nearest point where they can reach a safe anchorage.

The wooden jetties first built were quite effective in protecting the entrance while they lasted; but storms, ice and sea worms destroyed them in a few years. The jetty on the western side of the entrance has been partially replaced by a stone one; but the means at the disposal of the local authorities were not sufficient to extend this far enough to fully protect the entrance from the sand which drifts from the west, and practically nothing has been done in recent years

to protect the eastern side, from which direction large quantities of seaweed are annually driven into the harbor.

Upon the completion of the surveys it was found that directly opposite the present entrance and for a considerable distance to the east, shoal ground having less than 3 feet at mean low water extended for a considerable distance from the shore, while immediately to the westward of the present entrance the 3-foot curve approached within 200 feet of the high-water mark. It was seen that by excavating a channel on the westerly side of the existing stone jetty the entrance into the harbor would be considerably straightened, and deep water would be reached in less than half the distance from the shore than through a channel on the easterly side of this jetty. A plan was therefore devised for extending the existing stone jetty a distance of about 230 feet, and building a new stone jetty parallel with this one and about 100 to 150 feet farther west. Between these jetties a channel could be excavated 50 to 75 feet wide on the bottom, 3 feet deep at mean low water, and extending from the sound through into the pond, where there is an area of about 8 acres with a depth of over 3 feet at mean low water. This channel was estimated to cost not less than \$15,000, as follows:—

3,280 tons of granite quarry grout deposited in place, at \$2.50,	\$8,200 00
12,350 cubic yards of excavation, at \$0.45,	5,557 50
	<hr/>
	\$13,757 50
Ten per cent. for engineering and incidental work,	1,375 75
	<hr/>
Total,	\$15,133 25

After making these estimates, consultation was had with the selectmen of Harwich and other citizens interested in the matter, and they stated that the sanitary condition of the harbor was such that it was of great importance to have something done at once; also that the inhabitants would be fully satisfied for the present if such structures could be built as would result in maintaining the channel at its existing width and depth.

The situation seemed critical, as the place had begun to attract summer residents, a number of cottages had been

built, and others were under consideration ; but the offensive odors from the decaying eel grass had become so potent as to threaten to drive away visitors, unless something was undertaken forthwith in earnest of the intention to mitigate the nuisance.

For these reasons a modified plan of improvement was adopted and carried out under the provisions of chapter 463 of the Acts of 1899. The plan provided for extending the existing stone jetty on the westerly side of the entrance about 150 to 200 feet, and for building a timber jetty of oak piles and spruce lumber, similar to the one already built at Osterville, about 250 feet long, on the easterly side of the entrance parallel with and 100 feet easterly of the stone jetty ; the outer end of the timber jetty to be strengthened by having stone riprap piled around it.

A contract for the construction of the timber jetty was awarded to George H. Cavanagh, Sept. 21, 1899, for the sum of \$1,800, and the work was completed satisfactorily Nov. 17, 1899. A contract for the stone jetty was awarded to Eugene S. Belden, for \$3 per ton. On Dec. 1, 1899, about 600 tons of stone had been placed in the work, but, owing to the lateness of the season, the completion of the stone work will be delayed until next spring.

These structures are designed to maintain the existing width and depth of the channel, and to prevent obstruction by sand, which is annually driven into it from the beach to the westward by the winter storms, and also to prevent the seaweed from driving into the harbor, where it decays and settles, shoaling the water and emitting odors detrimental to health. The construction of the timber jetty has already substantially accomplished this last purpose, and it is anticipated that the portion of the stone jetty which has just been built will prevent the sand from driving in to any extent from the beach to the westward, and that both structures will have a tendency, by training the ebb and flow of the tides, to deepen the channel. It is estimated that the total cost will not exceed \$5,000.

LEWIS BAY.

A survey of Lewis Bay was made in August and September. A plane-table survey was made of the shore lines and their surroundings from Harbor Bluff up to the village, the balance of the topography being taken from the latest chart of the United States Coast and Geodetic Survey. Soundings were taken over the whole of the bay inside of Egg Island and out into the main harbor of Hyannis to a line beyond the entrances of the two channels leading into Lewis Bay. The survey shows that there is an area of about 377 acres in the main portion of the bay, having a depth of not less than 6 feet at mean low water, and a considerably greater depth over the larger portion of it. This area of deep water is connected with the main harbor of Hyannis by two channels, known as the main channel and the "drain." The main channel is located substantially parallel with and about 500 feet northerly of the promontory known as Point Gammon. It has a depth of not less than 6 feet at mean low water, over a width varying from about 100 feet to 300 feet. About midway between the ends of this channel a shoal or sand bar makes out from the Point Gammon shore, and forms a serious obstruction to boats and vessels passing through it. Near the outer end also a shoal makes out from the northerly side of the channel, but does not offer as great an obstruction to navigation as the one first mentioned. The "drain" is located on the north-westerly side of Egg Island, and about midway between the island and the main land at Hyannis. This channel is straighter than the main channel, but is not as wide or deep. It has an average width of about 100 feet, with a depth of not less than 6 feet at mean low tide, excepting at the outer end and at a point about 1,000 feet therefrom, where bars extend across the channel, having a depth of a little over 5 feet on them at mean low tide. This channel is located throughout its length at a considerable distance from the land, and, even if as large as the main channel, would be, from its location, more difficult to find unless it were properly buoyed. Most of the landings in the bay are located in the arm extending from Harbor Bluff up into the village.

This arm is composed of two small basins ; the outer one has an area of about 155 acres, with a depth of water varying from 6 to 11 feet at mean low tide, and a width of about 200 feet at its narrowest point. Between this deep water and that in the main portion of Lewis Bay there is a bar 300 feet wide, with a depth over it of a little more than 4 feet at mean low water. Between the outer and inner basins is what is known as "The Narrows." The natural channel connecting these had a navigable depth of a little over 1 foot at mean low water for a width of about 50 feet. Within a few years an artificial channel has been cut through the bar or sand pit on the easterly side of the natural channel, forming an artificial channel about 30 feet wide, with a depth of a little over 4 feet at mean low water. Within this inner basin is an area of about 2 acres, with a depth of over 6 feet at mean low water.

The Hyannis Yacht Club has a club house and wharf at the inner end of this basin, and there are a number of other boat landings on the shores of both basins. The mean rise and fall of the tide at Hyannis is about 3 feet, and the whole bay is completely landlocked. It would afford excellent shelter for any vessels which could reach it, but, owing to the shallow water, only small craft can be accommodated.

Estimates for 6 and 8 foot channels have been made. The main channel from the outer harbor into the bay is longer than the "drain," and, while it will not require a very large expenditure to dredge away the two points or bars, previously mentioned, to the depth of 6 feet at mean low water, no estimates for the improvement of this channel to any greater depth have been made ; believing that, if it is desired to have a depth of 8 feet, better results can be obtained by deepening and enlarging the "drain" than by improving the main channel. In the estimates for improving the "drain" the width of the channel has been fixed at 200 feet on the bottom, at depths of 6 and 8 feet respectively. In following as nearly as practicable the natural course of this channel, one bend only has been projected. In improving the channel in the bay, the width has been fixed at 200 feet on the bottom up to "The Narrows," so called, where the present artificial channel exists. Through "The Narrows" and up to the

wharf a bottom width of 150 feet has been fixed. Estimates for this channel are given for a depth of 6 feet and also of 8 feet.

ESTIMATES.

Channels from the Sound into Lewis Bay.

Improving main channel between Egg Island and Point Gammon:—

Excavation to depth of 6 feet at mean low water, 11,000 cubic yards, at 35 cents,	\$3,850 00
Engineering and contingent expenses,	500 00
	<hr/>
	\$4,350 00

Improving "drain":—

200 feet wide, 6 feet deep at mean low water, 13,000 cubic yards, at 35 cents,	\$4,550 00
Engineering and contingent expenses,	500 00
	<hr/>
	\$5,050 00

200 feet wide, 8½ feet deep at mean low water, 60,400 cubic yards, at 35 cents,	\$21,140 00
Engineering and contingent expenses,	2,110 00
	<hr/>
	\$23,250 00

Channel through the Bay to the Wharves.

Improving channel through inner basins, 6 feet deep at mean low water, 200 feet wide up to "The Narrows," 150 feet wide to wharf:—

To "The Narrows,"	3,000 cubic yards	
Through "The Narrows,"	13,900 cubic yards	
To the wharf,	8,100 cubic yards	
	<hr/>	
	25,000 cubic yards, at 45 cents,	\$11,250 00
Engineering and contingent expenses,		1,125 00
		<hr/>
		\$12,375 00

Same as above, but 8 feet deep at mean low water:—

To "The Narrows,"	19,000 cubic yards	
Through "The Narrows,"	18,200 cubic yards	
To wharf,	14,200 cubic yards	
	<hr/>	
	51,400 cubic yards, at 45 cents,	\$23,130 00
Engineering and contingent expenses,		2,320 00
		<hr/>
		\$25,450 00

The difference in cost between 6-foot and 8-foot channels from the sound to the wharves through the "drain," so called, appears from the estimates to amount to \$30,775. The Board is inclined to the opinion that the shallower chan-

nel with the depth of 6 feet at mean low water would sufficiently meet the demands of this locality for all ordinary enjoyment of fishing and pleasure sailing. While the opportunity for making a safe and commodious harbor for coasting vessels undoubtedly exists, that function is one pertaining to the federal government, and should be brought to the attention of Congress, in order that a proper survey and report might be made thereon.

EAST BAY.

A survey of East Bay at Osterville was made in September and October, after the completion of the field work at Lewis Bay. A plane-table survey was made of the shore line of the bay and of the portion of the sound between the wharf at Wianno and the Gaff boat landing, nearly a mile north-east up the coast. Soundings were taken over the whole bay and over the portion of the sound lying between the wharves above mentioned, out to a depth of 12 feet at mean low water. The bay itself covers an area of about 88 acres, and Centreville River, with its tributaries, whose waters flow into the bay, covers a slightly larger area. The mean range of the tide in the sound in this locality is about 3 feet. The greatest depth of water in the bay is about 4 feet, and the area having a depth exceeding 3 feet at mean low water is about 9 acres. The Centreville River has an average width of about 200 feet, with a narrow channel having from 3 feet to 4 feet of water at mean low tide, extending for a considerable distance beyond the limits of the survey. The outlet from the bay into the sound is through a shifting sand beach.

In 1846, the date of the first survey by the United States Coast and Geodetic Survey, the opening was located nearly opposite the middle of the bay. Since that time, through the action of natural forces, it has gradually worked to the eastward, the current cutting away the sand on the easterly side, and the wind and waves building up the westerly bank with the shifting sand, so that now the outlet channel is about 1,200 feet long, and is separated from the sound by a narrow ridge of sand.

Lying between this channel and Centreville River is a narrow neck of sand and marsh, which has already been

broken through by the waves in two places, so that at extreme tides the water flows across the marsh. The current in the outlet is sufficient to maintain a narrow channel having a depth of over 3 feet at mean low water; but at the point where it discharges into the sound the current is dispersed and the water spreads out over the flats, so that there is less than 1 foot in depth at mean low water in the channel across the flats, making it practically impossible to enter the bay with a boat drawing 2 feet or more, except at or near high water.

Opposite the present outlet a shoal extends some 1,300 feet from the shore, with a practically level surface, and having a depth of less than 1 foot at mean low water. Within the next 100 feet the water deepens rapidly to a depth of over 12 feet at mean low water. Toward the west the 12-foot contour rapidly recedes from the shore, until at a point about opposite the westerly side of the bay it is 2,400 feet from the shore, but here the bottom slopes gradually to the 12-foot contour. For this reason, plans and estimates have been made for two different channels. The first channel is located about opposite the middle of the bay and nearly at right angles to the general trend of the shore, to extend from a depth of 3 feet in the bay to 3 feet in the sound, to be 100 feet wide on the bottom, with side slopes of 5 to 1, to be protected at the entrance by two stone jetties located one on each side of the channel and extending from the crest of the beach into the sound to a depth of 4 feet at mean low water. These jetties would be about 1,100 feet long, and their construction would require about 13,700 tons of stone. The excavated channel would be about 1,600 feet long, and would require the removal of about 9,500 cubic yards of material. This plan is designed to provide an entrance to the harbor which will admit any boat such as is now used in this vicinity and as large as the present depth of water in the bay will accommodate.

The second channel is located from the bank at the outer edge of the flats opposite the present entrance channel, and is to extend nearly due west to a point near the westerly side of the bay, near a suitable location for a wharf readily accessible from the highway along the south-westerly side of the bay. This channel would be 10 feet deep at mean low water,

and have a width of 150 feet on the bottom, with side slopes of 5 to 1. It is designed to admit coasting vessels of considerable size, but, owing to the shallowness of the bay, it is necessary to extend the channel as above stated entirely across it. This channel is not designed as a harbor of refuge, but simply to enable the smaller class of coasting vessels to run here for the purpose of bringing coal, building materials and such other general merchandise as is required by the inhabitants. The entrance to this channel would be protected by two stone jetties, each about 1,600 feet long, and 20,000 tons of stone would be required in their construction. The excavated channel would be about 3,700 feet long, and would require the excavation of 192,000 cubic yards of material.

Estimates of the costs of the two projects are as follows : —

Channel 3 feet deep, 100 feet wide : —	
Excavation, 9,500 cubic yards, at 45 cents,	\$4,275 00
Jetties, 13,750 tons, at \$2.50,	34,375 00
	<hr/>
	\$38,650 00
Engineering and contingent expenses,	3,850 00
	<hr/>
	\$42,500 00
Channel 10 feet deep, 150 feet wide : —	
Excavation, 192,000 cubic yards, at 35 cents,	\$67,200 00
Jetties, 20,000 tons, at \$2.50,	50,000 00
	<hr/>
	\$117,200 00
Engineering and contingent expenses,	11,800 00
	<hr/>
	\$129,000 00

The great cost of either of these projects would seem to preclude them from consideration at the present time, if not altogether, as beyond the limit of commensurate benefit, relatively to expenditures for like purposes elsewhere.

The following table shows the amount of work which was done on the survey of these three harbors, and the cost thereof : —

Witchmere Harbor.

Shore line surveyed (miles),	1.8
Lines of soundings run (miles),	6.07
Number of soundings taken,	1,448
Lines of levels run (miles),5
Tide gauges established,	1

Lewis Bay.

Triangulation stations occupied,	14
Triangulation stations determined,	29
Shore line surveyed (miles),	3.42
Lines of soundings run (miles),	68.27
Number of soundings taken,	15,703
Lines of levels run (miles),5
Tide gauges established,	12

East Bay.

Shore line surveyed (miles),	4.14
Lines of soundings run (miles),	19.06
Number of soundings taken,	4,111
Lines of levels run (miles),	3.4
Tide gauges established,	8
Total cost of the three surveys,	\$1,503 64

NEW BEDFORD HARBOR.

The improvement by the federal government is progressing. A channel, 250 feet wide and 18 feet deep, has been excavated from the main channel through the new draw-bridge, and the work above is going on.

WOODS HOLE CHANNEL.

The project of the federal government at Woods Hole contemplates giving a channel 300 feet wide, with a depth of 13 feet at mean low water. It is estimated to cost \$396,000. This is a much-needed improvement and will greatly facilitate the passage of vessels of increased size between Buzzards Bay and Vineyard Sound. The swiftness of the tide, currently reported to be as high as 8 knots, in conjunction with the rocks and the deviousness of the channel, has heretofore rendered navigation through the channel both difficult and perilous. The result of this improvement, which it is expected will be completed in the spring or early summer, will be to greatly encourage the use of a most convenient passageway for pleasure as well as for business.

VINEYARD HAVEN.

During the great storm of November, 1898, the greatest number of marine disasters at any one place on our coast occurred at Vineyard Haven, where many vessels had sought

shelter to ride out the storm. Some forty-two schooners and barges, together with a barkentine, were either sunk at their anchors, driven ashore, dismasted or badly damaged. Fifteen men were rescued from the rigging of vessels at great peril to the rescuers, and one man died before assistance arrived.

It is the only large harbor between Provincetown and Newport, and is in the direct line of coastwise traffic between New York and Boston for all vessels going through the sound, the greater part of which are sailing craft and coal barges in tow, and they frequently seek refuge in this commodious haven.

It has a wide entrance of more than a mile and an anchorage area of about 757 acres, with over 18 feet of water at low tide, unobstructed by shoals or ledges. There are no obstructions of any kind to contend with or to make it difficult for sailing vessels to manœuvre in bad weather. The bottom affords good holding ground, — a feature of the utmost importance. It is well protected from gales from every quarter except the north-east, although that unfortunately is the direction from which the heaviest storms of winter come. As this harbor offers no protection in north-easters, mariners must either run for Newport, 45 miles away, or Chatham Roads, 32 miles distant, unless they can find shelter in Tarpaulin Cove or Hyannis, or under the lee of Falmouth. All these places, however, are open to the south, and if the wind should shift to that direction, vessels anchored there would be obliged to take the full force of the storm.

The great disaster of the November storm had brought these conditions and the improvement of this harbor to the careful attention of the Board; but further consideration of the question was rendered unnecessary when it was learned that the rivers and harbors act of the last session of Congress called for an examination of this subject by the War Department. In pursuance of this matter Major Lockwood, the United States engineer in charge of the district, has made a recent report, recommending that a board of engineers be appointed to make a thorough study of Nantucket and Vineyard sounds, with reference to the location of proper harbors of refuge therein.

CONNECTICUT RIVER.

The matter of improving the navigation of the Connecticut River as far as the cities of Springfield and Holyoke is in temporary abeyance.

In December last, in pursuance of the requirements of chapter 104 of the Resolves of 1898, the chairman of the Board, in company with a delegation from Springfield, visited Washington and appeared before the rivers and harbors committee of Congress, and advocated the projected improvement of navigation of the river above Hartford, Conn., as set forth in the special report of the Board to the Legislature in January, 1898. The congressional committee reported in favor of a more extended survey and examination, and the bill passed the House of Representatives, but was stricken out of the rivers and harbors bill in the Senate. There is a strong association of prominent citizens of the Connecticut valley organized for the purpose of urging this improvement before Congress. It is a project worthy of completion, and no effort should be spared in the interests not only of the Massachusetts cities and towns on the Connecticut River, but of the whole Commonwealth, in the endeavor to realize the benefits which would necessarily result therefrom.

The attention of the Board has been called to the erosive effects of the last spring freshets at the "High Banks" in the town of Hadley. If the Legislature should again make an appropriation, as heretofore, at Hadley, West Springfield and Agawam, the river may be kept within its present banks, and property saved from destruction.

If \$1,000 is appropriated, as in 1896, by chapter 77 of the Resolves of that year, for the purpose of continuing a general survey of the river within the Commonwealth, as projected in chapter 344 of the Acts of 1885, the results cannot fail to be valuable as a contribution to the records of the counties and to the scientific data of the Commonwealth.

GREAT PONDS.

In the Great Ponds of the Commonwealth there are islands of which the ownership is unknown. They are gradually becoming more or less valuable, as their utility for different

purposes becomes appreciated. There are several such islands in the ponds on Martha's Vineyard, also in Plymouth and Essex counties, and perhaps elsewhere in the State. In pursuance of its duty to ascertain the location, extent and description of the lands belonging to the Commonwealth, and to investigate her title thereto as required by Public Statutes, chapter 19, section 3, and chapter 144 of the Acts of 1886, the Board has taken steps to assert the ownership of the Commonwealth over such as it is informed are unclaimed, and to ascertain the title to those in doubt.

All the Great Ponds should be surveyed, and a record thereof made. A small annual appropriation for this purpose would enable the Board to accomplish this object within a reasonable time.

PROVINCE LANDS.

The experience of the past year justifies continued confidence in the success of the undertaking. Notwithstanding the unusual violence of the winds during the last twelve months, the sand has remained in place over the planted areas, and the vegetation has not materially suffered. The work of the year has gone on as usual. About the first of April the planting began along the slope of the southern range of sand hills, where it was left at the close of last season, and a considerable quantity of growing trees and shrubs were transplanted, comprising several varieties of pines, besides poplars, Scotch broom and bayberry. Grass planting was begun at the last of the month, but the unusual drought of the early spring necessitated a discontinuance of all labor until the autumn. In spite of the severity of the drought, most of the trees and shrubs survived the transplanting and are doing well. There was no measurable rain fall in April and May, and but a slight amount in June.

About the middle of September beach-grass planting was resumed, and continued well into the month of November. Some 35 acres have been covered with beach grass during the season, which is 15 acres more than last year. This makes a total of about 125 acres in all covered up to the present time. Throughout the whole area the grass acts successfully as a sand-binder against the most violent gales, and wherever the grass is lodged the wind has no power to

move the sand. The trees and shrubs are growing, interspersed where wind breaks are desired, and in due time the dunes will be covered with a small forest of vegetation.

Some considerable work has been done toward keeping the roads on the lands safe for travel, but no extension of the road out toward the outside of the Cape has been possible.

Of the liberal appropriation given last winter to cover a period of three years, one-third is now spent, in accordance with the intent of the act.

Fishermen who desire to have huts on the outside of the Cape and land their catch of fish out there, instead of making the long sail or row around Long Point into Provincetown harbor, have been permitted so to do. The only disadvantage which arises therefrom is the serious cutting the road gets from hauling the heavy loads of fish over to town; but the roads are made to be used, and the comfort and benefit to the fishermen are considerable.

During the past year the superintendent, under the direction of the Board, sent notices to all users of cranberry patches and mowing lots, who had not given them up, to call and arrange for a continuance of such use, when not considered detrimental to the public purposes and enjoyment of the land, upon payment of a small fee or tax, which is collected and paid into the State treasury. In this way the products of the soil are not allowed to go to waste under the eyes of those who need them, and the ownership of the Commonwealth receives due recognition.

The report * of the Superintendent of the Province Lands may be found in the Appendix.

BACK BAY LANDS.

In February the attention of the Board was called to a violation of one of the restrictions in a deed from the Commonwealth of land at the corner of Berkeley and Boylston streets, in Boston. The violation consisted in the erection of a structure in the reserved space between the building line and the sidewalk. Upon notification the owners appeared before the Board and contended that the structure was not of a nature intended to be excluded by the restrictions in the

* See Appendix E.

deed. After consultation, however, the Board concluded that the structure complained of ought to be removed, and so ordered, and the same was removed within the time fixed.

HANGMAN'S ISLAND.

An application was made in January for an extension of the lease of Hangman's Island, in Boston harbor; and the Board, being satisfied that there was no detriment to the Commonwealth and the applicants were proper persons, and that there were public advantages in having the island occupied by responsible parties, executed a lease of the same for a term of three years, at the rate of \$50 per year.

GREAT STORM OF NOVEMBER, 1898.

For some time after the great storm of November, 1898, the Board was visited by the selectmen of the towns along the shore where the greatest damage occurred, with a view to obtaining such assistance and advice as, in the nature of things, it was possible and proper for the Board to give. Conferences were held with representatives of Duxbury, Marshfield, Sandwich, Marblehead, Scituate and Harwich, and in consequence thereof the Board through the winter and spring visited the several places to which its attention had been called, with a view to noting personally the havoc of the storm and rendering such assistance as was in its power. The destruction to life and property was excessively severe, and led in some instances to legislative aid, to wit, chapter 463 of the Acts of 1899, being an act to provide for the survey and improvement of harbors, and for repairing damages occasioned by storms along the coast line or river banks of the Commonwealth.

At Scituate, as was stated in last years' report, the sea opened a new passage into North River between the third and fourth cliffs. This opening created a new harbor on a dangerous coast, which might well answer the purpose of a harbor of refuge, if in no other respect useful. Consequently the Board had a survey made of the new mouth of this river, which showed an opening of 320 feet between the cliffs and an interior anchorage basin of about 3 acres, with

a depth exceeding 6 feet, at mean low water. As soon as this survey was plotted and printed it was freely distributed, with a view to disseminating information valuable to yachtsmen and sailors. It is proper, however, to draw attention to the fact that this is not the first time that North River has emptied into the sea through the opening which at present exists, and that it would not be unnatural for the present opening to be closed by the operations of nature, as it has been before. The soundings which appear on the plan represent the condition at the time the survey was made; but on a shore where the sands are rapidly shifting, and bars to the river mouth have formed before, it must be expected that they will form again. Consequently, while the depths given may be used as guides, they should not, as time passes, be relied upon as accurately measuring the depth of water at any given time in the future. A copy of the above plan is printed herewith.

WRECKS AND OBSTRUCTIONS.

During the year the Board has caused the removal of the following wrecks and obstructions, under chapter 260 of the Acts of 1883: —

Schooners “Caroline Knight,” “Montezuma,” “W. H. Y. Hackett,” from South Boston flats; “Mary E. Hagan” from the northerly edge of the main ship channel near the lower middle shoal in Boston harbor.

An obstruction consisting of an old boiler tube partially buried, with an end dangerously projecting, and a piece of an oak pile, was located in Fort Point Channel by a diver and taken out.

A small mud scow found adrift by the harbor master of Boston was moored by him to a dolphin near the Marine Park at South Boston, and reported to the Board. As no ownership could be established, the scow was taken by the Eastern Dredging Company, with the consent of the Board, thus avoiding expense to the Commonwealth.

Each year the Board is called on to remove one or more worn-out or wrecked vessels, abandoned by the owners and left where likely to become dangerous to other vessels. The Board has always taken the ground in removing such wrecks

that the only safe way is to break them up and place them at some point above high-water mark where they cannot by any possibility again get into tide water.

WORK OF THE UNITED STATES IN RIVERS AND HARBORS OF THE COMMONWEALTH.

The Board is indebted to Col. Charles R. Suter, Corps of Engineers, U. S. A., who is in charge of river and harbor improvements in eastern Massachusetts, and Maj. D. W. Lockwood, Corps of Engineers, U. S. A., who is in charge of similar work in southern Massachusetts, for the following statements, which show the work accomplished in the rivers and harbors of this Commonwealth during the fiscal year ending June 30, 1899: —

STATEMENT OF COL. CHARLES R. SUTER, CORPS OF ENGINEERS, U. S. A.

Boston, Mass., Dec. 4, 1899.

The Board of Harbor and Land Commissioners, Commonwealth of Massachusetts, Boston, Mass.

GENTLEMEN: — In accordance with your request of Nov. 28, 1899, I have the honor to furnish the following summary of the work done by the United States during the fiscal year ending June 30, 1899, in the rivers and harbors of Massachusetts.

The works of improvement under my charge on June 30, 1899, were: —

- | | |
|--|---|
| 1. Merrimac River. | 13. Mystic and Malden rivers. |
| 2. Powow River. | 14. Charles River. |
| 3. Newburyport harbor. | 15. Weymouth ("Fore" and "Back") River. |
| 4. Essex River. | 16. Town River. |
| 5. Harbor of Refuge, Sandy Bay, Cape Ann. | 17. Scituate harbor. |
| 6. Gloucester harbor. | 18. Duxbury harbor. |
| 7. Manchester harbor. | 19. Plymouth harbor. |
| 8. Salem harbor. | 20. Provincetown harbor. |
| 9. Lynn harbor. | 21. Chatham harbor. |
| 10. Boston harbor. | 22. Wrecks. |
| 11. Chelsea Creek. | 23. Examinations and surveys. |
| 12. Mystic River, below mouth of Island End River. | 24. Repair of sea-wall at Marblehead, Mass. |

The river and harbor act of March 3, 1899, made appropriations for these works as follows :—

Merrimac River,	\$40,000 00
Powow River,	12,000 00
Newburyport harbor,	25,000 00
Essex River,	10,000 00
Harbor of refuge, Sandy Bay,	250,000 00
Gloucester harbor,	40,000 00
Manchester harbor,	5,000 00
Boston harbor,	75,000 00*
Mystic River, below Island End River,	50,000 00
Mystic and Malden rivers,	5,000 00
Weymouth River,	10,000 00
Town River,	8,000 00
Scituate harbor,	15,000 00
Duxbury harbor,	12,000 00
Plymouth harbor :—	
For maintenance,	10,000 00
For repairs made necessary by great storm	
of November, 1898,	75,000 00
Provincetown harbor,	10,000 00
Chatham harbor,	3,732 79
	<hr/>
	\$655,732 79
Appropriated by sundry civil act of March 3,	
1899 :—	
Boston harbor, main ship channel,	163,751 00
	<hr/>
Total,	\$819,483 79
	<hr/> <hr/>

The Secretary of War was also authorized, by the river and harbor act, of March 3, 1899, to enter into contracts for the completion of a channel 1,200 feet wide and 30 feet deep at mean low water from the main ship channel in President Roads, through Broad South Channel, at a maximum cost of \$450,000.

These appropriations became available too late for active operations to be started in their expenditure during the fiscal year. No material change has been made in the several projects of improvement, and the appropriations will be expended in furtherance of these projects.

Operations have been in progress during the last fiscal year upon improvements at harbor of refuge, Sandy Bay, Cape Ann,

* Of which \$5,000 could be expended on Chelsea Creek and \$5,000 on Broad Sound Channel, at the discretion of the Secretary of War.

Mass., Boston harbor, Mass., removal of wrecks, examinations and surveys, and the work accomplished was as follows :—

Harbor of Refuge, Sandy Bay.

Operations were continued under a contract with the Rockport, Pigeon Hill and Cape Ann granite companies. There were 67,527 tons of stone deposited in extension of the substructure of the breakwater during the year, and the contract was completed on March 31, 1899.

Boston Harbor.

Operations were continued under the continuing contract dated Feb. 11, 1897, with Messrs. Breyman Bros. of Toledo, O., to dredge 2,910,718 cubic yards, more or less, of material from and in completion of the proposed main ship channel, 1,000 feet wide and 27 feet deep at mean low water, under the project of Aug. 11, 1892.

During the fiscal year 671,394.5 cubic yards of material were dredged from the "Narrows" in the lower main ship channel. On June 30, 1899, this section of the dredging was nearly completed, and one dredge had been transferred to the upper main ship channel.

The lower main ship channel from Boston Light to President Roads is now 27 feet deep at mean low water and 1,000 feet wide, excepting that at the "Narrows" it is obstructed by ledges uncovered by the dredging, which contract the clear width of channel to about 800 feet. The removal of these ledges will probably be commenced in the spring of 1900.

The full estimated amount of money necessary to complete the project of Aug. 11, 1892, has been appropriated by Congress, and is now available.

Wrecks.

On March 31, 1899, the wreck of schooner "J. M. Eaton" was removed from the entrance to Pigeon Cove harbor, Rockport, Mass., under a contract with F. Scripture, dated March 6, 1899.

On June 8, 1899, the wreck of a vessel, name unknown, was removed from the Weymouth Fore River, Mass., under a contract dated May 28, 1899, with Hiram W. Phillips of Quincy, Mass.

On April 25, 1899, it was reported that a wreck lying in Chatham harbor, Mass., was an obstruction to navigation, and on April 28, 1899, \$250 was allotted for its removal. Bids were opened for this work on June 26, 1899, but no contract was entered into during the fiscal year.

On June 24, 1899, the wreck of the small schooner "Lydia

Jane," in Provincetown harbor, Mass., was reported an obstruction to navigation, and on June 28, 1899, \$250 was allotted for its removal. Nothing further was done toward the removal of the wreck during the fiscal year ending June 30, 1899.

Examinations and Surveys.

The river and harbor act of March 3, 1899, ordered preliminary examinations or surveys to be made, and reports submitted for the following localities: Sandy Bay, Mass.; Winthrop harbor, Mass.; piers and breakwater at Rockport, Mass.; Beverly harbor, Mass.; Sandwich harbor, Mass., and Cohasset harbor, Mass. At the close of the fiscal year preliminary reports had been made upon Sandy Bay, Mass.; piers and breakwater at Rockport, Mass., and Cohasset harbor, Mass.; and surveys were recommended for Cohasset harbor and piers and breakwater at Rockport.

Very respectfully,

CHAS. R. SUTER,
Colonel, Corps of Engineers.

STATEMENT OF MAJ. D. W. LOCKWOOD, CORPS OF ENGINEERS,
U. S. A.

NEWPORT, R. I., Dec. 4, 1899.

MR. WOODWARD EMERY, *Chairman, Board of Harbor and Land Commissioners, Boston, Mass.*

SIR:—In compliance with your request of November 28, I enclose you a summary of the work done by the United States during the fiscal year ending June 30, 1899, in the rivers and harbors in Massachusetts.

Respectfully,

D. W. LOCKWOOD,
Major, Corps of Engineers, U. S. A.

Abstract of work of river and harbor improvement in the State of Massachusetts by the United States government, under the direction of Maj. D. W. Lockwood, Corps of Engineers, U. S. Army, for the fiscal year ending June 30, 1899:—

Hyannis Harbor.

No work was in progress during the fiscal year.

The present project for the improvement of this harbor contemplates the dredging of an area of 36 acres protected by the breakwater to a depth of 15.5 feet. Of this area, about 26.6 acres have been dredged, and two cuts, each 25 feet wide and 13 feet deep, have been dredged in to the wharf of the New York, New Haven & Hartford Railroad Company.

Nantucket Harbor.

A contract was awarded for continuing the construction of jetties at the entrance to the harbor. The contract provides for raising the submerged portions of both the east and west jetties to the half-tide level, and making slight repairs to portions of the jetties damaged by storms and ice.

Vineyard Haven Harbor.

No work was in progress during the fiscal year. The project for the protection of the bluffs on the East and West Chops has been completed.

Woods Hole Channel.

A contract was awarded for continuing the deepening and widening of the channel in the strait leading into Buzzards Bay. The project for this improvement contemplates securing a channel 300 feet wide and 13 feet deep at mean low water.

New Bedford Harbor.

Contracts were awarded for dredging in the anchorage area and in the channel leading through the new draw. There is now a channel 200 feet wide and 18 feet deep from Buzzards Bay to New Bedford, and the existing project provides for an anchorage area $\frac{1}{2}$ mile long and 600 feet wide and a channel 250 feet wide from the main channel through the new drawbridge, all having a depth of 18 feet at mean low water.

Canapitsit Channel.

No work was in progress during the fiscal year. The project for the improvement of this channel has been completed.

Taunton River.

A contract was awarded for dredging in this river in the reach just above Berkley bridge. There are still a few points at which deepening and widening are required below Berkley bridge.

Removal of Wrecks.

During the fiscal year the following wrecks were removed, so as to no longer form obstructions to navigation:—

Schooner "Asia," on Killpond Bar, Nantucket Sound, in 8 feet of water.

Barge "Excelsior," on Killpond Bar, Nantucket Sound, in 12 feet of water.

Schooner "Angola," about $1\frac{1}{4}$ miles W. N. W. of Cross Rip Light Ship in about 50 feet of water, in Vineyard Sound.

Schooner "Melinda Wood" in Hyannis harbor, in 14 feet of water.

Schooner "Fannie Flint," about $1\frac{1}{4}$ miles south by west from Pollock Rip Light Ship, in about 35 feet of water.

INSPECTIONS MADE BY THE BOARD DURING THE YEAR.

1898.

- Dec. 3. Green Harbor, in Marshfield, and the beach from a point opposite Powder Point bridge nearly to the old mouth of North River, to ascertain the effects of the great storm of November, 1898.
6. Shores and beaches of Marblehead harbor, to ascertain the effects of the great storm of November, 1898. Premises of George H. Burton, in Swampscott, relative to proposed removal of material from the beach.
- 7-13. Docks and terminal facilities, in New York and other ports, with reference to the construction of pile platforms at the new pier and to other improvements on the Commonwealth flats at South Boston.
27. Beaches in Hull, relative to the removal of material therefrom, and to ascertain the effects of the great storm of November, 1898.

1899.

- Jan. 6. { Terminal facilities in Boston, in company with the
7. { mayor and harbor commissioners of Montreal.
17. { Beach near the Black Rock House, in Cohasset, rela-
20. { tive to laying a drain pipe in tide water.
23. { Work done on channel and jetties, at Osterville,
24. { authorized by chapter 483 of the Acts of 1897 and
chapter 440 of the Acts of 1898.
24. { Scorton harbor and portions of Sandwich, to ascertain
the effect of the great storm of November, 1898.
24. { Shore property of Mrs. Martha M. Magee, in Bever-
ly, relative to laying drain pipe in tide water.
26. { Work done by the Commonwealth on the Province
27. { Lands, in Provincetown, in company with the legis-
lative committee on harbors and public lands.
- Feb. 21. Fort Point Channel, opposite Hecht's wharf, in Bos-
ton, for the purpose of locating an obstruction to
navigation.

1899.

- Feb. 23. { East Bay in Osterville, Lewis Bay in Hyannis, Witch-
 24. { mere harbor in Harwich, in company with the legis-
 { lative committee on harbors and public lands.
28. Buildings on Boylston Street, in Boston, relative to alleged violation of restrictions in deeds from the Commonwealth.
- March 6. South Bay, near Dorchester Avenue, relative to the dumping of material without authority from the Board.
8. Fort Point Channel, opposite Hecht's wharf, in Boston, to ascertain if an obstruction to navigation had been removed.
17. Tuck's Point, in Beverly, relative to alleged removal of material from the beach.
21. White Head flats, in Hull Bay, relative to the dumping of dredged material.
23. { Menamsha Inlet in Gay Head and Chilmark, and Lake
 25. { Anthony in Cottage City, to obtain data for prepar-
 { ing plans and specifications of work authorized by
 { chapters 133 and 155 of the Acts of 1899.
- April 4. Shore property of Mrs. Martha M. Magee and W. S. and J. T. Spaulding, in Beverly, relative to work in tide water.
6. Outlet of Winter Pond, in Winchester, on complaint made to the Board relative to an obstruction therein.
13. Sites of proposed canal across Cape Cod, in company with the legislative committee on harbors and public lands.
24. Work done on channel and jetties at Osterville, under direction of the Board.
28. Shores and beaches in Scituate, to ascertain the effects of the great storm of November, 1898.
29. Work done under direction of the Board on jetties at Green Harbor, in Marshfield, under chapter 469 of the Acts of 1898.
- May 2. Wharf on Fort Point Channel, in Boston, occupied by Marston Coal Company, relative to proposed improvements. Charles River, near the Abattoir in Brighton, relative to dredging done in vicinity of sea wall. Work done and in progress on the Commonwealth flats at South Boston.
3. Site of dumping ground for dredged material, at mouth of Coles River, in Swansea.

1899.

- May 9. Banks of the Connecticut River, above and below the village of Hadley, to ascertain their condition. Protective works built by the Commonwealth on the western bank of the river, at Agawam and West Springfield. Property of White, Holman & Co., on Chelsea Creek in Chelsea, relative to proposed bulkhead and filling.
12. Beach at Hough's Neck, in Quincy, relative to the removal of material therefrom.
15. Beach between Point Allerton and Strawberry Hill, in Hull, relative to proposed removal of material.
18. Site of dumping done in South Bay without authority from the Board.
25. { Work done at Menamsha Inlet, in Gay Head and
27. { Chilmark, under direction of the Board.
29. Beach between Point Allerton and Strawberry Hill, in Hull, relative to the proposed removal of material.
- June 1. { Work done on jetties at Green Harbor, in Marshfield,
2. { under the direction of the Board. Salters Beach
and the Gurnet, in Plymouth, relative to the proposed removal of gravel. Site of dumping in Mystic River, near Malden bridge, in Charlestown.
7. Stony Beach, in Hull, relative to the depositing of material thereon.
9. { Work done at Menamsha Inlet, in Gay Head and
10. { Chilmark, under the direction of the Board.
12. Property of the New England Gas and Coke Company on Mystic River, in Everett, relative to displacement of tide water.
15. Shores of Lake Whalom, in Lunenburg, relative to alleged encroachments.
17. Work done on jetties at Green Harbor, in Marshfield, under the direction of the Board.
30. Beaches in Hull, relative to the removal of material therefrom.
- July 5. Property of C. C. Hanley, on Town River, in Quincy, relative to proposed structure and filling.
7. { Work done on channel and jetties at Osterville, under
10. { the direction of the Board.
11. {
12. Work done on channel and jetties at Lake Anthony, in Cottage City, under chapter 441 of the Acts of 1898 and chapter 155 of the Acts of 1899.
13. Flats in the vicinity of Jeffries Point, in East Boston.

1899.

- July 14. New mouth of North River, in Scituate. Tidal stream in Essex, on complaint that the same has been obstructed.
15. {
24. { Work done on jetties at Green Harbor, in Marshfield,
25. { under the direction of the Board.
28. Work done on channel and jetties at Osterville, under the direction of the Board.
- Aug. 4. Lewis Bay, in Hyannis, in connection with a survey of the same, in progress, under chapter 96 of the Resolves of 1899. Site of proposed work by the Granville Rugg estate on Merrimac River, in Haverhill.
5. Work on jetties and channel at Lake Anthony, in Cottage City, under the direction of the Board.
9. {
10. { Work done on channel and jetties in Osterville, under
the direction of the Board. Lewis Bay, in Hyannis,
in connection with a survey of the same, in progress.
11. Witchmere harbor, in Harwich, relative to work proposed to be done by the Commonwealth under chapter 463 of the Acts of 1899.
12. Work done by the Commonwealth on the Province Lands, at Provincetown.
16. Phillips Beach, in Marblehead, relative to the proposed removal of material.
16. {
17. { Work done on jetties at Green Harbor, in Marshfield,
under the direction of the Board.
18. Constitution wharf, in Boston, relative to proposed pile structures.
19. Work done on jetties and channel at Lake Anthony, in Cottage City, under the direction of the Board.
22. Site of obstruction to navigation in Boston harbor, near the Marine Park at South Boston.
23. {
24. { Work done on channel and jetties in Osterville, under
the direction of the Board. Lewis Bay, in Hyannis,
in connection with a survey of the same, in progress.
28. Work in progress at new pier and dock and on other portions of the Commonwealth flats at South Boston.
30. Hicks bridge, in Westport, relative to proposed repairs.
- Sept. 1. {
2. { Work done at Lake Anthony in Cottage City, and at
Menamsha Inlet in Gay Head and Chilmark, under
the direction of the Board. Swan Neck Island, in
Edgartown. Harbor at Cuttyhunk.

1899.

- Sept. 7. Work done on jetties at Green Harbor, in Marshfield, under the direction of the Board.
8. South bank of Charles River, at a point one and one-half miles below the Abattoir in Brighton, to verify a report that a coffer-dam, built during the laying of a pipe from the shore into the river, had been removed.
8. { Work done on channel and jetties in Osterville, under
9. { the direction of the Board. Lewis Bay, in Hyannis,
in connection with a survey of the same, in progress.
11. Site of proposed bridge across Acushnet River, in Acushnet.
15. { Work done on jetties at Green Harbor, in Marshfield,
16. { under the direction of the Board.
18. Work done and in progress on the Commonwealth flats at South Boston.
22. Wharf of the American Soda Fountain Company on Fort Point Channel, in Boston, relative to the dumping of refuse material.
23. Work done on jetties at Lake Anthony, in Cottage City, under the direction of the Board. Highway and bridge bordering on Assowompsett Pond, in Lakeville, relative to proposed encroachment.
26. Work done on jetties at Green Harbor, in Marshfield, under the direction of the Board.
28. Beach at Hough's Neck, in Quincy, relative to the proposed removal of material.
29. { Work done on channel and jetties in Osterville. New
30. { outlet of Scorton River, in Sandwich.
- Oct. 6. Dock on South River, in Salem, relative to proposed filling.
17. Property on Boylston Street, in Boston, relative to alleged violation of restrictions in deeds from the Commonwealth.
19. New Bedford and Fairhaven bridge, in company with the Railroad Commissioners.
20. Work done on channel and jetties at Lake Anthony, in Cottage City, under the direction of the Board. Site of proposed wharf of Alfred C. Harrison, in Woods Hole Little harbor.
- Nov. 2. Work done on jetties at Witchmere harbor, in Harwich, under chapter 463 of the Acts of 1899.

1899.

- Nov. 3. Waquoit Bay, and ponds in Falmouth, relative to desired improvements. Wharf of the New York and Boston Dyewood Company, in East Boston, relative to proposed extension.
7. Work done at Menamsha Inlet, in Gay Head and Chilmark, under the direction of the Board.
8. Site of proposed filling, by Henry W. Smith and others, in Chelsea Creek, Chelsea. Wharves and docks of George F. Welch, in Scituate, relative to proposed filling.
9. { Work done on channel and jetties at Lake Anthony, in Cottage City, under the direction of the Board.
 { Site of proposed wharf and dredging on Squam River, in Gloucester. Wharf property of Rockport Granite Company, in Folly Cove, Gloucester.
13. Site of dumping being done near Weeks' wharf, at East Boston.
16. Site of proposed work at wharf of Read Bros., on Taunton River, in Fall River.
17. {
 21. { Dumping at sea of material dredged from channels of
 22. { Boston harbor.
25. Work done on jetties at Witchmere harbor, in Harwich; work done on channel and jetties at Osterville, under the direction of the Board.

LICENSES GRANTED DURING THE YEAR.

- Nos.
 2200. Petition of the city of Boston for license to build a temporary pile platform annexed to Warren bridge on Charles River in the city of Boston. Granted Dec. 6, 1898.
2201. Petition of the city of Boston for license to build a pile platform in a dock on Roxbury Canal in the city of Boston. Granted Dec. 7, 1898.
2202. Petition of Montgomery & Howard for license to construct a launching-way, on piles, on Chelsea Creek in the city of Chelsea. Granted Dec. 7, 1898.
2203. Petition of the Garfield and Proctor Coal Company for license to widen its wharf, on piles, on Acushnet River in the city of New Bedford. Granted Dec. 7, 1898.
2204. Petition of George L. Damon for license to build and maintain a bulkhead, pile platform and solid filling, on Charles River in the city of Cambridge. Granted Dec. 14, 1898.

Nos.

2205. Petition of the Boston Electric Light Company for approval of plans for building fender-guards at Congress Street bridge, in connection with the laying of wires across Fort Point Channel in the city of Boston, under authority of chapter 249 of the Acts of 1898. Granted Dec. 19, 1898.
2206. Petition of William B. Stearns for license to build and maintain a marine railway and dolphins in Marblehead harbor in the town of Marblehead. Granted Dec. 22, 1898.
2207. Petition of the New England Gas and Coke Company for license to build a pile platform and dolphins on Island End River and Mystic River in the city of Everett. Granted Dec. 28, 1898.
2208. Petition of Harry E. Converse for license to maintain a wharf as now built and to extend the same in Buzzards Bay at Charles Neck in the town of Marion. Granted Jan. 18, 1899.
2209. Petition of Elsie M. Hollingsworth for license to build and maintain a pile pier in Vineyard Haven harbor in the town of Tisbury. Granted Jan. 18, 1899.
2210. Petition of John Smith and John L. Mitchell for license to maintain a pile wharf as now built, and to construct a dolphin, in Hull Bay in the town of Hull. Granted Feb. 1, 1899.
2211. Petition of Sylvia B. Knowlton for license to build and maintain a solid-filled wharf in Marion harbor in the town of Marion. Granted Feb. 1, 1899.
2212. Petition of Margaret F. Carroll for license to build and maintain a boat landing in Great Herring Pond in the town of Plymouth. Granted Feb. 1, 1899.
2213. Petition of George N. Swallow for license to lay and maintain a drain pipe in Massachusetts Bay in the town of Cohasset. Granted Feb. 3, 1899.
2214. Petition of the Turners Falls Lumber Company for license to hang and maintain booms in Connecticut River in the towns of Gill and Montague. Granted Feb. 3, 1899.
2215. Petition of the Metropolitan Water Board for approval of plans for driving piles, constructing a fender-guard and laying water pipe in and across Saugus River, northwesterly of Fox bridge, in the city of Lynn and town of Saugus, as authorized by chapter 488 of the Acts of 1895. Granted Feb. 16, 1899.

- Nos.
- 2216. Petition of William K. Niver & Co. for license to rebuild their wharf on Fort Point Channel in the city of Boston. Granted Feb. 16, 1899.
 - 2217. Petition of the Old Colony Railroad Company for license to widen its bridge, extend abutment and fill solid, in South Bay in the city of Boston. Granted Feb. 16, 1899.
 - 2218. Petition of the Lynn & Boston Railroad Company for approval of plans for constructing a pile bridge across Saugus River, north-westerly of Fox bridge, in the city of Lynn and town of Saugus, as authorized by chapter 202 of the Acts of 1859. Granted Feb. 17, 1899.
 - 2219. Petition of the Fiske Wharf and Warehouse Company for license to widen its north pier, on piles, in Boston harbor in the city of Boston. Granted March 7, 1899.
 - 2220. Petition of David W. Low and Charles H. Porter for license to build and maintain a pile and timber boat landing and float stage on Little River in the city of Gloucester. Granted March 7, 1899.
 - 2221. Petition of the Lynn & Boston Railroad Company for approval of plans for constructing a steel bridge across a creek in the town of Revere flowing between Pines River and the upland, as authorized by chapter 202 of the Acts of 1859. Granted March 16, 1899.
 - 2222. Petition of the Lynn & Boston Railroad Company for approval of plans for constructing a pile bridge across Pines River in the towns of Revere and Saugus, as authorized by chapter 202 of the Acts of 1859. Granted March 16, 1899.
 - 2223. Petition of the Lynn & Boston Railroad Company for approval of plans for constructing a steel bridge across a creek in the town of Saugus flowing between Pines River and Saugus River, as authorized by chapter 202 of the Acts of 1859. Granted March 16, 1899.
 - 2224. Petition of William H. Herbolt for license to build a bulkhead and fill solid in Provincetown harbor in the town of Provincetown. Granted March 17, 1899.
 - 2225. Petition of the Board of Park Commissioners of Worcester for license to build and maintain a boat landing in Lake Quinsigamond at Lake Park in the town of Shrewsbury. Granted March 17, 1899.

Nos.

2226. Petition of the Metropolitan Water Board for approval of plans for laying a water pipe across Mystic River in the city of Medford and town of Arlington, northerly of the bridge across said river at High Street, as authorized by chapter 488 of the Acts of 1895. Granted March 21, 1899.
2227. Petition of the New England Telephone and Telegraph Company of Massachusetts for approval of plans for laying a submarine conduit for cables and wires under and across the draw-ways in Congress Street bridge on Fort Point Channel in the city of Boston, under authority of chapter 249 of the Acts of 1898. Granted March 28, 1899.
2228. Petition of the Boston Electric Light Company for approval of plans for driving piles and laying a conduit for electric wires across Fort Point Channel at Dover Street bridge in the city of Boston, under authority of chapter 249 of the Acts of 1898. Granted March 28, 1899.
2229. Petition of the Nantasket Beach Steamboat Company for license to build an extension to Nantasket Pier, on piles, and to construct and maintain dolphins in Weir River in the town of Hull. Granted March 30, 1899.
2230. Petition of Edward W. Chadwick for license to build and maintain a pile pier in Edgartown harbor at Chap-paquiddick in the town of Edgartown. Granted April 6, 1899.
2231. Petition of the Plymouth Cordage Company for license to build sea walls, fill solid and construct two wooden box sewers, in Plymouth harbor in the town of Plymouth. Granted April 11, 1899.
- 2231 A. Petition of the National Dock and Warehouse Company for license to build a sea wall and pile platform, and fill solid a portion of its dock, in Boston harbor at East Boston. Granted April 12, 1899.
2232. Petition of Martha M. Magee for license to lay and maintain a drain pipe in Beverly harbor in the city of Beverly. Granted April 14, 1899.
2233. Petition of Walter M. Lowney and others, trustees, for license to rebuild and extend their wharf, partly solid and partly on piles, in Boston harbor, adjoining Atlantic Avenue in the city of Boston. Granted April 20, 1899.

- Nos.
- 2234. Petition of the Massachusetts Pipe Line Gas Company for approval of plans for laying a pipe under Mystic River, easterly of and near Malden bridge in the city of Boston, as authorized by chapter 537 of the Acts of 1896. Granted April 20, 1899.
 - 2235. Petition of the Boston & Albany Railroad Company for license to rebuild the head of its Dock No. 8, Grand Junction wharves, in Boston harbor at East Boston, by building a sea wall and pile platform or wharf, and excavating in said dock. Granted May 2, 1899.
 - 2236. Petition of Ira B. Cushing for license to build and maintain a pile pier and float stage in Red Brook harbor in the town of Bourne. Granted May 2, 1899.
 - 2237. Petition of the Board of Metropolitan Sewerage Commissioners for approval of plans for placing stone riprap over a portion of the sewer in Shirley Gut between Point Shirley and Deer Island, under authority of chapter 439 of the Acts of 1889. Granted May 4, 1899.
 - 2238. Petition of George A. Gardner and George P. Gardner for license to build and maintain a wharf and float stage in Buzzards Bay at Monument Beach in the town of Bourne. Granted May 5, 1899.
 - 2239. Petition of the Curtis and Pope Lumber Company for license to extend its wharf, on piles, on Roxbury Canal in the city of Boston. Granted May 8, 1899.
 - 2240. Petition of John Pridgeon, Jr., for license to extend his wharf, on piles, in Vineyard Haven harbor in the town of Cottage City. Granted May 8, 1899.
 - 2241. Petition of Orlando E. Lewis for license to fill flats in Crystal Cove southerly of Washington Avenue in the town of Winthrop. Granted May 8, 1899.
 - 2242. Petition of the Boston Transit Commission for approval of plans for constructing a draw foundation, draw-fender piers and fender-guards for Charlestown bridge on Charles River in the city of Boston, as authorized by chapter 548 of the Acts of 1894. Granted May 12, 1899.
 - 2243. Petition of the Marston Coal Company for license to widen its wharf, on piles, on Fort Point Channel in the city of Boston. Granted May 16, 1899.
 - 2244. Petition of William E. Gutterson for license to widen his wharf, on piles, on Fort Point Channel in the city of Boston. Granted May 16, 1899.

Nos.

2245. Petition of Francis W. Parsons and William V. Kellen for license to build and maintain dikes in Dam Pond, Middle Pond and Isham Pond, flowing into North Bay, and to excavate a canal, at Osterville in the town of Barnstable. Granted May 31, 1899.
2246. Petition of Henry Bigelow Williams for license to build and maintain a pile pier in Nantucket harbor near Brant Point in the town of Nantucket. Granted May 31, 1899.
2247. Petition of Sol Smith Russell for license to build and maintain a pile pier and boat house in Edgartown harbor in the town of Edgartown. Granted May 31, 1899.
2248. Petition of the Boston Elevated Railway Company for license to rebuild a portion of Lincoln wharf in Boston harbor in the city of Boston. Granted June 16, 1899.
2249. Petition of the Mosquito Fleet Yacht Club for license to build and maintain a pile pier and float stage in Old Harbor at South Boston. Granted June 16, 1899.
2250. Petition of the New England Gas and Coke Company for license to build a pile wharf and bulkhead, fill solid, excavate and dredge, in Island End River in the city of Everett. Granted June 19, 1899.
2251. Petition of the Edison Electric Illuminating Company of Boston for license to build sea walls and fill solid in Fort Point Channel in the city of Boston. Granted June 19, 1899.
2252. Petition of Dexter H. Craig for license to extend his wharf, partly solid and partly on piles, and to dredge, in Plymouth harbor in the town of Plymouth. Granted June 26, 1899.
2253. Petition of the city of Boston for license to build a pile wharf in Boston harbor at Long Island. Granted June 27, 1899.
2254. Petition of May A. Coleman for license to build and maintain a pile pier in Nantucket harbor in the town of Nantucket. Granted June 27, 1899.
2255. Petition of Harry E. Weston for license to build and maintain a boat house, on piles, in Lake Whalom in the town of Lunenburg. Granted June 27, 1899.
2256. Petition of Emma Rosson for license to build and maintain a portion of a boat house, on piles, and a float stage, in Lake Quannapowitt in the town of Wakefield. Granted June 27, 1899.

Nos.

2257. Petition of John S. Shannon for license to maintain a boat landing, on piles, and a float stage, in Lake Whalom in the town of Lunenburg. Granted June 27, 1899.
2258. Petition of the city of Boston for approval of plans for constructing a pile bridge across Mystic River at the site of Malden bridge, as authorized and required by chapter 280 of the Acts of 1899. Granted July 7, 1899.
2259. Petition of the Massachusetts Pipe Line Gas Company for approval of plans for constructing a tunnel, laying a pipe and sinking two shafts in and under Charles River at the draw ways in Charlestown bridge; also for driving piles, constructing pile platforms and placing riprap, under authority of chapter 537 of the Acts of 1896. Granted July 7, 1899.
2260. Petition of John Morrison for license to extend and rebuild a portion of Maverick wharf in Boston harbor at East Boston. Granted July 7, 1899.
2261. Petition of Caroline A. Breed and Henry B. Sprague for license to build a bulkhead, fill solid, drive piles and construct dolphins in Lynn harbor in the city of Lynn. Granted July 7, 1899.
2262. Petition of the city of Cambridge, by its board of park commissioners, for license to change the present shore line of Charles River between Brookline Street and River Street, in the city of Cambridge, by constructing a sea wall and by excavating and filling. Granted July 19, 1899.
2263. Petition of the city of Cambridge, by its board of park commissioners, for license to change the present north-easterly shore line of Charles River from a point near Boylston Street bridge to a point above the Cambridge Hospital grounds, in the city of Cambridge, by constructing sea walls and bulkheads and by excavating and filling. Granted July 19, 1899.
2264. Petition of the Board of Metropolitan Park Commissioners for license to change the present south-westerly shore line of Charles River from a point near Boylston Street to a point opposite the Cambridge Hospital grounds, in the city of Boston, by excavating and filling. Granted July 19, 1899.
2265. Petition of the Crescent Boat Club for license to build a boat house, on piles, on Charles River westerly of Essex Street bridge in the city of Boston. Granted Aug. 1, 1899.

Nos.

2266. Petition of the Massachusetts Pipe Line Gas Company for approval of plans for constructing a tunnel and laying a pipe under and across Charles River southerly of and near Cambridge Street bridge in the cities of Boston and Cambridge, as authorized by chapter 537 of the Acts of 1896. Granted Aug. 1, 1899.
2267. Petition of the city of Boston for license to widen the present draw way in Chelsea bridge, north, on Mystic River in the cities of Boston and Chelsea, and to build a temporary pile bridge on the up-stream side of said bridge. Granted Aug. 1, 1899.
2268. Petition of Henry R. Reed for license to build and maintain a stone and timber pier and float stage in Marion harbor in the town of Marion. Granted Aug. 1, 1899.
2269. Petition of the United States, by Col. Charles R. Suter, for license to build a pile wharf in Boston harbor at Lovell's Island. Granted Aug. 2, 1899.
2270. Petition of the city of Boston for approval of plans for constructing a steel bridge over Fort Point Channel in the extension of Atlantic Avenue (formerly Cove Street) westerly of Federal Street bridge, in the city of Boston, as authorized and required by chapter 466 of the Acts of 1899. Granted Aug. 2, 1899.
2271. Petition of C. C. Hanley for license to build bulkheads and pile platform, to fill solid and dredge, in Town River, in the city of Quincy. Granted Aug. 9, 1899.
2272. Petition of Henry J. Brennan for license to build and maintain piers and a float stage in Lake Whalom in the town of Lunenburg. Granted Sept. 12, 1899.
2273. Petition of J. W. Goodnow for license to build and maintain a pile wharf on Vineyard Sound at Falmouth Heights in the town of Falmouth. Granted Sept. 12, 1899.
2274. Petition of the Gardner Electric Light Company for license to build a retaining wall and fill solid in Crystal Lake in the town of Gardner. Granted Sept. 12, 1899.
2275. Petition of Harvard University for license to drive piles and construct approaches and platforms for a boat house on Charles River, northerly of North Harvard Street bridge in the city of Boston. Granted Sept. 12, 1899.
2276. Petition of the Lynn Gas and Electric Company for license to build a sea wall and bulkhead and fill solid in Lynn harbor in the city of Lynn. Granted Sept. 14, 1899.

Nos.

- 2277. Petition of Nathaniel E. Harlow for license to build a bulkhead and fill solid in Plymouth harbor in the town of Plymouth. Granted Sept. 14, 1899.
- 2278. Petition of the North Packing and Provision Company for license to widen its wharf, on piles, on Millers River in the city of Somerville. Granted Sept. 14, 1899.
- 2279. Petition of Fred J. Gifford and J. C. McCarthy for license to build a sea wall and fill solid in Palmers Cove in the city of Salem. Granted Sept. 14, 1899.
- 2280. Petition of the Plymouth Cordage Company for license to build a sea wall and sewer, and to fill solid, in Plymouth harbor in the town of Plymouth. Granted Sept. 14, 1899.
- 2281. Petition of Charles H. Boynton for license to extend his wharf, on piles, in Gloucester harbor in the city of Gloucester. Granted Sept. 14, 1899.
- 2282. Petition of the Merchants and Miners Transportation Company for license to build pile structures at the head of the dock between Constitution wharf and Battery wharf in the city of Boston. Granted Sept. 18, 1899.
- 2283. Petition of Alfred C. Harrison for license to build and maintain a stone and pile pier in Woods Hole Little harbor in the town of Falmouth. Granted Sept. 19, 1899.
- 2284. Petition of John A. Jeremiah for license to build and maintain a pile pier, boat ways and float stage in Edgartown harbor at Chippaquiddick Island in the town of Edgartown. Granted Sept. 19, 1899.
- 2285. Petition of the Boston Transit Commission for license to build a pile wharf on Charles River, on the westerly side of the Charlestown approach to the Charlestown bridge in the city of Boston. Granted Sept. 19, 1899.
- 2286. Petition of the city of Malden, by its board of street commissioners, for license to fill solid and build a culvert in Malden River, and to excavate and change the course of a portion of said river in the city of Malden. Granted Sept. 21, 1899.
- 2287. Petition of the Thomson-Houston Electric Company for license to construct two dolphins in Saugus River in the city of Lynn. Granted Sept. 21, 1899.
- 2288. Petition of the Merchants and Miners Transportation Company for license to build a pile structure at the head of the north dock of Constitution wharf in the city of Boston. Granted Sept. 21, 1899.

Nos.

2289. Petition of the city of Boston for license to build a crib and inlet box in Boston harbor on the easterly side of Long Island. Granted Sept. 21, 1899.
2290. Petition of the estate of J. P. Monks for license to build a bulkhead and pile wharf, fill solid and dredge, in Boston harbor near the Reserved Channel at South Boston. Granted Sept. 27, 1899.
2291. Petition of the city of Boston for license to build a sea wall or bulkhead and fill solid in Mystic River adjoining the north-westerly side of Alford Street in the city of Boston. Granted Sept. 28, 1899.
2292. Petition of the Massachusetts Pipe Line Gas Company for approval of plans for driving piles in Mystic River adjoining Alford Street in the city of Boston, as authorized by chapter 537 of the Acts of 1896. Granted Sept. 28, 1899.
2293. Petition of the city of Boston for approval of plans for constructing a temporary pile bridge across Mystic River near Malden bridge in the city of Boston, under authority of chapter 280 of the Acts of 1899. Granted Oct. 3, 1899.
2294. Petition of the town of Westport, by its highway surveyor, for license to repair the highway, including the bridge known as Hicks bridge, in and over the east branch of Westport River in the town of Westport. Granted Oct. 3, 1899.
2295. Petition of the Garfield and Proctor Coal Company for license to drive piles, build a sea wall and fill solid, in Acushnet River in the city of New Bedford. Granted Oct. 5, 1899.
2296. Petition of the West End Street Railway Company for license to build bulkheads and fill solid in Mystic River in the cities of Boston and Somerville. Granted Oct. 6, 1899.
2297. Petition of the city of Medford for license to build a head wall at the mouth of Gravelly Creek on Mystic River in the city of Medford. Granted Oct. 12, 1899.
2298. Petition of the West End Street Railway Company for license to build bulkheads and fill solid in Chelsea Creek at East Boston. Granted Oct. 16, 1899.
2299. Petition of Charles A. Campbell for license to build pile wharves and to dredge in Mystic River in the city of Chelsea. Granted Oct. 16, 1899.

- Nos.
- 2300. Petition of the Boston, Revere Beach & Lynn Railroad Company for license to fill solid in Boston harbor southerly of Washington Avenue in the town of Winthrop. Granted Oct. 26, 1899.
 - 2301. Petition of Orlando E. Lewis for license to fill flats in Crystal Cove southerly of Washington Avenue in the town of Winthrop. Granted Oct. 26, 1899.
 - 2302. Petition of the Union Freight Railroad Company for license to dump snow and ice into Charles River, in the city of Boston. Granted Nov. 6, 1899.
 - 2303. Petition of the Boston Elevated Railway Company for license to dump snow and ice into tide waters. Granted Nov. 6, 1899.
 - 2304. Petition of John Rood and the firm of Almy, Bigelow & Washburn, for license to build a sea wall and fill a dock on South River in the city of Salem. Granted Nov. 6, 1899.
 - 2305. Petition of the New York & Boston Dyewood Company for license to extend its wharf, on piles, in Boston harbor at East Boston. Granted Nov. 6, 1899.
 - 2306. Petition of the county commissioners of Plymouth County for license to widen a highway and bridge in and over Assowampsett Pond in the town of Lakeville. Granted Nov. 6, 1899.
 - 2307. Petition of Alfred C. Harrison for license to build and maintain a stone and pile pier in Woods Hole Little harbor in the town of Falmouth. Granted Nov. 8, 1899.
 - 2308. Petition of the city of Boston, by the superintendent of streets, for license to dump snow and ice into tide waters. Granted Nov. 9, 1899.
 - 2309. Petition of the Massachusetts Pipe Line Gas Company for approval of plans for laying a pipe in and under Charles River at the draw way in Cambridge Street bridge in the cities of Boston and Cambridge. Granted Nov. 14, 1899.
 - 2310. Petition of the Lewis Wharf Company for license to drive piles in the dock adjoining the southerly side of Lewis wharf, also within the present lines of said wharf, in the city of Boston. Granted Nov. 14, 1899.
 - 2311. Petition of George F. Welch for license to build bulkheads and fill solid in two docks in Scituate harbor in the town of Scituate. Granted Nov. 14, 1899.

Nos.

2312. Petition of the Sturtevant Wharf and Storage Company for license to extend its wharf, on piles, in Boston harbor at East Boston. Granted Nov. 17, 1899.
2313. Petition of Andrew A. Meyer for license to build and maintain a pile pier and dredge a channel in Quincy Bay at Hough's Neck in the city of Quincy. Granted Nov. 17, 1899.
2314. Petition of Everett Joy for license to build and maintain a pile pier in Lake Anthony in the town of Cottage City. Granted Nov. 23, 1899.

MISCELLANEOUS PERMITS GRANTED DURING THE YEAR.

- CHARLES S. GOODING, to remove gravel and sand from a portion of the beach at Kenberma in Hull. Granted Dec. 30, 1898.
- BENJAMIN P. WARE, to remove material from his beach at Clifton in Marblehead. Granted Dec. 30, 1898.
- BATCHELDER BROTHERS, to dump snow from Federal Street bridge into tide water in the city of Boston. Granted Jan. 4, 1899.
- FRANK C. HYDE, to remove gravel and sand from a portion of the beach at Kenberma in Hull. Granted Jan. 5, 1899.
- EMMA E. HOBART, to remove gravel and sand from a portion of the beach at Kenberma in Hull. Granted Jan. 5, 1899.
- F. W. JOHNSON, to remove material from the beach in front of his upland at Clifton in the town of Marblehead. Granted Jan. 18, 1899.
- BAY STATE DREDGING COMPANY, to dredge not exceeding 75,000 cubic yards of material in Shirley Gut, Boston harbor. Granted Jan. 27, 1899.
- CITY OF BOSTON, to lay water pipe in Bullock Street on the South Boston flats. Granted Jan. 31, 1899.
- ABBOTT W. LAURENCE, to dump snow from Dover Street bridge into tide water in the city of Boston. Granted Feb. 21, 1899.
- JOHN H. LANGMAID and FRANK A. LANGMAID, to remove gravel and sand from the beach in front of their upland in Marblehead. Granted March 7, 1899.
- JOSEPH A. BOWEN, to dump material dredged in Fall River harbor on flats north-west of Mattapoissett Rock in Coles River, Swansea. Granted March 9, 1899.

NEW YORK, NEW HAVEN & HARTFORD RAILROAD COMPANY, to lay and maintain, temporarily, tracks across certain lots on the South Boston flats, for the purpose of transporting filling for streets. Granted April 11, 1899.

ANDREW A. MEYER, to remove gravel from the beach in front of his upland at Hough's Neck in Quincy. Granted May 12, 1899.

WILLIAM H. ALLES, to remove gravel and sand from the beach in front of his land at Point Allerton in Hull. Granted May 17, 1899.

GEORGE E. PARKER, to remove gravel and sand from the beach in front of his upland at Clifton in Marblehead. Granted May 17, 1899.

JULIAN B. HART AND OTHERS, to remove gravel and sand from the beach in front of their land at Point Allerton in Hull. Granted June 1, 1899.

JOSEPH L. BOARDMAN, to remove gravel from a portion of Salter's Beach in Plymouth. Granted June 5, 1899.

NEW ENGLAND GAS AND COKE COMPANY, to dredge in Mystic River below the mouth of Island End River. Granted June 8, 1899.

S. ISAACS, to remove gravel from the beach at Wind Mill Point in Hull. Granted June 8, 1899.

ELLEN F. BLODGETT, to remove shale or gravel from the beach in front of her house on Beach Avenue at Kenberma in Hull. Granted June 8, 1899.

A. J. WELLINGTON, to remove shale or gravel from the beach in front of his land at Kenberma in Hull. Granted June 8, 1899.

SELECTMEN OF THE TOWN OF HULL, to remove gravel from the beach in Hull Bay, opposite Bay Avenue, between K and Q streets, in Hull. Granted June 12, 1899.

COL. CHARLES R. SUTER, to remove gravel from the beach bordering on Hull Bay between Strawberry Hill and White Head in Hull, for use by the United States government. Granted June 22, 1899.

CAMBRIDGE BRIDGE COMMISSION, to dredge in Charles River south-erly of and near West Boston bridge. Granted July 7, 1899.

SELECTMEN OF THE TOWN OF HULL, extending the time limit named in a permit for the removal of gravel from a beach in Hull, dated June 12, 1899. Granted July 7, 1899.

- CHARLES HOWARD SMITH, to remove gravel from the beach in Hull Bay, lying midway between the crossing of the New York, New Haven & Hartford Railroad at Point Allerton and Windermere station ; also from the easterly bar of Hog Island in Hull Bay. Granted July 31, 1899.
- ALONZO E. SMITH, to dump the material dredged in Powow River under contract with the United States government on the low lands above mean high-water mark, on either bank of said river. Granted Aug. 8, 1899.
- WILLIAM B. BUCKMINSTER, to remove stone and other material from the beach in front of his upland at Clifton in the town of Marblehead. Granted Aug. 17, 1899. -
- BOSTON ASYLUM AND FARM SCHOOL FOR INDIGENT BOYS, to remove gravel from a bar at Thompson's Island in Boston harbor. Granted Aug. 18, 1899.
- THOMAS F. KELLY, to use a portion of the South Boston flats for storage purposes. Granted Sept. 14, 1899.
- PROPRIETORS OF THE NEW MATTAKESETT CREEKS, to dredge a channel in Katama Bay, Edgartown harbor, and to deposit the dredged material. Granted Sept. 18, 1899.
- ANDREW A. MEYER, to remove gravel from the beach in front of his upland at Hough's Neck in Quincy. Granted Oct. 6, 1899.
- WALTER S. OSBORN, to dredge on the northerly side of the pile portion of Osborn's wharf in Edgartown harbor, and to deposit the dredged material. Granted Oct. 12, 1899.
- SOUTH BOSTON GAS LIGHT COMPANY, to lay a gas main in B Street on the South Boston flats. Granted Oct. 24, 1899.
- HOWARD W. SPURR AND OTHERS, to dredge a channel in Edgartown harbor in front of their land bounding on said harbor and to deposit the dredged material. Granted Oct. 26, 1899.
- BAY STATE DREDGING COMPANY, to dump material dredged in Duxbury harbor, under contract with the United States government, on a portion of the beach on the easterly side of said harbor. Granted Oct. 27, 1899.
- JOSEPH E. WHITE, to dump material dredged in Weymouth Fore River, under contract with the United States government, on flats in Rock Island Cove in Quincy. Granted Nov. 17, 1899.
- HARTFORD DREDGING COMPANY, to dump material dredged in Plymouth harbor, under contract with the United States government, easterly of and adjoining Long Beach in Plymouth. Granted Nov. 17, 1899.

HARBOR COMPENSATION FUND.

There was paid into the treasury of the Commonwealth during the year, under sections 14 and 16 of chapter 19, Public Statutes, and chapter 146, Acts of 1897, in payment for tide water displaced by work done under licenses granted by the Board, and for rights and privileges granted in tide waters and great ponds, the sum of \$4,607.94, which was credited to the harbor compensation fund for Boston harbor. The amount in this fund on Nov. 30, 1899, was \$258,297.63; the income from this fund on the same date was \$23,109.55.

COMMONWEALTH'S FLATS IMPROVEMENT FUND.

The balance in the Commonwealth's flats improvement fund on the first day of December, 1898, was \$109,656.27. To this has been added during the year \$11,009.91 from the income of the fund and \$442,830.90 from sales and rents of lands and from other sources, making a total of \$563,497.08. Of this sum, there has been expended during the year \$48,-227.94, leaving an available balance on Nov. 30, 1899, of \$515.269.14.

SALARIES OF COMMISSIONERS.

The attention of the Legislature is again invited to the inadequate compensation of the Board, in the belief that the increased work and responsibility of the commission will receive due consideration.

The foregoing report is respectfully submitted.

WOODWARD EMERY,
CLINTON WHITE,
CHARLES C. DOTEN,

Commissioners.

DEC. 1, 1899.

APPENDIX.

APPENDIX.

[A.]

[See page 7 of this report, *ante*.]

CONTRACT.

ARTICLES OF AGREEMENT, MADE THIS SIXTH DAY OF MARCH IN THE YEAR EIGHTEEN HUNDRED AND NINETY-NINE, BY AND BETWEEN THE COMMONWEALTH OF MASSACHUSETTS, ACTING BY THE BOARD OF HARBOR AND LAND COMMISSIONERS WITH THE APPROVAL OF THE GOVERNOR AND COUNCIL, AND GEORGE A. CAHILL OF BOSTON IN SAID COMMONWEALTH, HEREINAFTER DESIGNATED AS THE CONTRACTOR.

The Contractor hereby covenants and agrees with the Commonwealth to provide all the labor and materials and to do and complete all the work necessary and proper in building an oak pile platform on the two sides and outer end of the solid portion of the new pier or wharf which is now being built by the Commonwealth on the South Boston Flats in Boston Harbor, all the work to be done and completed in the manner and in accordance with and subject to the terms and conditions set forth in the following specifications.

The word "Engineer" when used herein shall mean the Engineer of the Board of Harbor and Land Commissioners, acting directly or through his properly authorized agents, when within the scope of the particular duties intrusted to them.

SPECIFICATIONS.

The Contractor is to furnish all the plant, tools, appliances, labor and materials necessary to build the pile platform and put it in condition for use, as follows:—

The platform is to be located on the two sides and outer end of the solid portion of the pier or wharf which the Commonwealth is now building on the South Boston Flats east of Pier No. 4 of the New England Railroad Company.

The solid portion of the wharf is 1,150 feet long and 300 feet wide, and the pile platform is to form a continuous belt or apron 50 feet wide contiguous to its two sides and outer end.

The platform is to be built of oak piles, with rough oak braces and hard pine timber.

A series of six plans on file in the office of the Board of Harbor and Land Commissioners marked "Platform for New Pier, South Boston Flats, January, 1899," and signed by Frank W. Hodgdon, Engineer, show the location, size and method of construction of the platform, and are referred to and made a part of these specifications, and are to be referred to for all details not specifically mentioned herein.

PILES AND PILE-WORK.

All piles are to be new white or red oak sticks, with the bark on, sound, straight, and free from large knots or other imperfections which would materially affect the strength of the timber; not less than 50 per cent. of the piles to be white oak. They are to be not less than 14 inches in diameter five feet from the butt, and not less than 7 inches in diameter at the point, when ready for driving, including the bark in both cases. They are to be of the lengths shown on the plan and are to be carefully driven to such depths as the Engineer may prescribe, in order that they can be capped at the required grade without unnecessary waste of the butt.

No knotty, rotten, worm-eaten, split, peeled or partly peeled, or loose-bark piles will be accepted.

All piles must be carefully and thoroughly driven to the satisfaction of the Engineer; and any pile which may be driven in a wrong position or which may not be long enough for capping after being driven or which may be split in driving, shall be drawn up and out and another substituted.

All spurshores are to be fitted in a workmanlike manner and bolted to the main piles with two 1 $\frac{1}{4}$ -inch screw bolts for each spurshore.

The fender piles are to be bolted to the main piles with 1 $\frac{1}{4}$ -inch screw bolts with counter-sunk heads, one bolt in each fender pile.

Each bent of piles is to be stiffened by girders and braces of rough oak, as shown on the plan.

The girders are to be hewn or sawed on one side, and are to be large enough to square at least 4 inches by 5 inches at the small end, and are to be fastened to the piles by one 1-inch screw bolt in each bearing.

At the two outer corners the face of the platform is to be

rounded, and to have the fender piles of white oak, large and well-shaped, driven close together and bolted to the framing of the platform by two 1½-inch screw bolts in each pile, the heads of the bolts to be counter-sunk to the depth of 5 inches, wherever required to give full bearing between the piles; white oak chocks are to be fitted and securely fastened in place. The whole platform at the corners is to be heavily braced, as shown on the plans, special care being taken to have the work done thoroughly by competent workmen.

All piles from south of the fortieth degree of North latitude must be cut between the first day of September and the first day of March of the following year. North of that line they may be cut one month later.

FLOOR.

The main piles are to be capped with 6-inch by 12-inch double girder caps, bolted to the piles with 1-inch screw bolts, two bolts in each pile, with two additional bolts in each butt joint. The girder caps to be covered by a 7-inch by 14-inch rider cap, fastened to the girder cap by ½-inch spike bolts 13 inches long, one every 4 feet.

The floor is to consist of stringers spaced two feet on centers and breaking joints throughout, each stringer to extend over at least two bays, and all butts must come on the rider caps. The stringers next to the fender caps to be 8-inches by 14-inches, and all others 6-inches by 14-inches.

The stringers are to be covered by 3-inch plank laid heart side up planed on one side to even thickness and spiked to the stringers with 7-inch steel wire nails, two nails in each end and one in each other bearing. No plank is to be less than 8 inches wide, and all are to be laid with open joints ⅜-inch wide.

The fender piles are to be capped by a solid 12-inch by 14-inch stick on edge with scarfed joints 2 feet long, each scarf bolted with four ¾-inch screw bolts.

Wherever the shoulder on any pile projects beyond the edge of the cap, it shall be bevelled off in a neat manner.

QUALITY OF LUMBER.

All lumber except the piles and rough oak braces is to be long leaf yellow pine of the quality known as "Prime," and defined in the rules regulating the classification and inspection of yellow pine lumber as adopted by the Southern Lumber and Timber Association in 1883. The oak braces are to be sound, straight and free from large knots.

PRESERVATION.

When the heads of the piles have been prepared to receive the caps and before the caps are put on, they are to be thoroughly covered with a coat of the dead oil of coal tar, containing not less than 40 per cent. of naphthaline, applied at a temperature of not less than 120° Fahrenheit, or with such similar preparation as may be approved by the Engineer.

BOLTS.

All bolts are to be of the best double refined iron. They are to have upset button or counter-sunk heads as required, of a diameter not less than $1\frac{3}{4}$ times the diameter of the bolt. Wrought iron plate-washers $3\frac{1}{2}$ inches square for $1\frac{1}{4}$ -inch bolts and 3 inches square for 1-inch bolts, and all $\frac{3}{8}$ -inch thick are to be used under the nuts and heads of all screw bolts, except that under the heads of those through fender piles, there are to be ring washers of $\frac{5}{8}$ -inch round iron with ends firmly welded together.

BELAY POSTS.

There are to be 4 large and 27 smaller cast-iron belay posts, the large ones to be located on the two outer corners of the platform where shown on the plan; the smaller ones to be located along the sides and ends of the pier at such places as shall be designated from time to time by the Engineer. The posts are to be of the size and dimensions shown on the detail plans of the same. They are to be made of tough gray cast-iron of the best quality, the castings to be free from blow-holes, cinder patches or cold-shuts, and are to be finished in a workmanlike manner, with the surfaces smooth and full and free from sand. The thickness of metal throughout to be as shown on the plans, and if required by the Engineer, holes shall be drilled at such places in the casting as he may direct to determine the thickness of the metal. If found to be as specified, the holes to be tapped and properly plugged.

The posts at the corners of the platform are to stand on the foundations prepared for them, as shown on the detailed plans. The smaller posts to stand on a special foundation prepared for each one, consisting of two 12-inch by 14-inch stringers on edge, laid upon the rider caps and extending over three bents. They are to be fastened to the bents by two 1-inch bolts, 38 inches long in each end bearing and two 1-inch bolts 36 inches long in the middle bearing. A 4-inch block is to be placed under the girder caps at each bearing to receive the ends of the bolts. A floor 6

inches thick and $2\frac{1}{2}$ feet square is to be laid across the stringers over the middle bearing. It is to be gained down into the stringers 2 inches and fastened to them by 10-inch steel wire spikes. Each post to be fitted to its foundation and bolted to it by four $1\frac{1}{2}$ -inch screw bolts with large counter-sunk heads, filling and rounding above the holes in the base of the casting, with heavy washers under the nuts, the bolts to extend through the timber foundation.

RIPRAP.

Stone riprap consisting of granite quarry chips, weighing from 10 to 300 lbs., to be placed around and among the piles of the platform and against the face of the wall at such times and places and in such quantities as the Engineer may direct.

The quantity of riprap used shall be determined by weight, and if brought to the work in vessels shall be determined by the Engineer from marks placed on the vessel by a legally qualified weigher, whose sworn certificate of the correctness of such marks at a recent date shall be furnished to the Engineer by the Contractor before the delivery of the first cargo of stone by such vessel. If deemed necessary by the Engineer, the weight marks of any such vessel may at any time be verified under his direction at the expense of the Contractor.

If the stone riprap is brought to the work in any other way, the Contractor is to provide a method of determining the weight, which shall be satisfactory to the Engineer.

PLANE OF REFERENCE.

The plane of mean low water to which all elevations and grades mentioned in these specifications are referred is that established and used in the work of the improvements by the Commonwealth on the South Boston Flats.

OTHER CONTRACTS.

It is hereby mutually agreed that as the work under the contract for constructing the solid portion of the pier or wharf may not be fully completed before the beginning of the work under this contract, due regard shall be maintained for the rights and conveniences of the parties working under each contract, and as far as possible nothing shall be done to hinder or delay the progress of the work under either contract, but on the other hand each party will do everything that under the circumstances is reasonably right and proper to facilitate the work of the other.

GENERAL CLAUSES.

The work shall be done so as not to interfere with the use of the wharf and dock of the New England Railroad Company, which adjoin the location of the platform herein contracted for.

Upon the completion of the work the Contractor is to remove from the premises all materials and refuse left from the construction, and to leave the premises in a condition satisfactory to the Engineer.

The aforesaid plans, and the surveys with the calculations based thereon, are believed to be correct; but the Contractor must examine for himself, as no allowance will be made for any errors or inaccuracies which may be found therein, and the Commonwealth does not guarantee them to be even approximately correct.

The drawings and specifications are intended to be explanatory of each other; but should any discrepancy appear, or misunderstanding arise as to the import of anything contained in either, the explanation and determination of the Engineer shall be considered final and binding on the Contractor. Any errors or omissions in drawings or specifications may be corrected by the Engineer, such correction to govern all work only from the time that the Engineer gives notice in writing thereof.

In all questions which may arise concerning measurement, lines and grades, or of interference with other work or contractors, the decision of the Engineer to be final. All lines and grades will be given by the Engineer, but all necessary aid and materials for giving or indicating them to be furnished by the Contractor at his own expense, and the marks given shall be carefully preserved.

Any materials condemned or rejected by the Engineer may be branded or otherwise marked, and shall, on demand, be at once removed from the work.

Any unfaithful or imperfect work which may be discovered before the final acceptance of the completed structure shall be corrected immediately, and any unsatisfactory materials delivered shall be rejected on the requirement of the Engineer, notwithstanding that they may have been overlooked in previous inspection. The inspection of the work shall not relieve the Contractor of any of his obligations to perform good work as herein described; and all work of whatever kind which, during its progress and before it is finally accepted, may become damaged from any cause, shall be removed and replaced by good and satisfactory work at the expense of the Contractor, and all completed work shall be maintained by him in good condition until the final acceptance of the whole work.

The Contractor hereby agrees to do such extra work in connection with the construction of the platform as may be ordered in writing by the Board of Harbor and Land Commissioners, and to accept in payment for the same, its reasonable cost as estimated by the Engineer, plus 15 per centum of said estimated cost.

The Contractor shall have no claim for compensation for extra work unless the same is ordered in writing by said Board, and unless the claim for the same is presented to said Board before the fifteenth day of the month following that during which each specific order is complied with.

Convenient facilities for the inspection of the work shall be furnished by the Contractor whenever requested by the Engineer. All instructions and directions of the Engineer to be strictly observed and followed, and when the Contractor is not present to receive them, they shall be received and obeyed by the superintendent or foreman who may have charge of that particular work in reference to which they are given. All of the work to be done to the satisfaction of the Engineer, and with such machinery and appliances, and by such methods, as shall be approved by him, and to the acceptance of said Board and not otherwise.

The work is to be commenced as soon as in the opinion of the Engineer the work of building the solid portion of the pier or wharf has advanced far enough to allow the work on the platform to be carried on without material delays or interruptions caused by that work, and the platform shall be completed as soon as practicable but not later than July 1, 1900.

In all operations connected with the work the Contractor shall comply with all laws or regulations affecting in any way the conduct of those engaged on the work, or the methods of doing the work, and persons employed in the performance of manual labor under this contract shall not be required to work more than nine hours in each day, and said nine hours shall constitute a day's work; and in the employment of mechanics and laborers in the construction of the work herein contracted for preference shall be given by the Contractor to citizens of the United States.

The Contractor shall take all responsibility of the work and take all precautions for preventing injuries to persons and property in or about the work, and shall assume the defence of and indemnify and save harmless the Commonwealth, its officers and agents, from all actions at law and claims relating to labor or materials furnished for the work, or to inventions, patents or patent rights used in doing the work, or to injuries to any person or corporation received or sustained by or from the Contractor or his employees in doing the work, or in consequence of any improper materials,

implements or labor used therein, or relating to any act, omission or neglect of the Contractor or his employees therein.

In no event whatever shall the Contractor be entitled to any compensation from the Commissioners, their servants or agents, on account of any acts or omissions under or growing out of this contract.

If the work to be done under this contract shall be abandoned by the Contractor, or if the Engineer at any time shall be of opinion, and shall so certify in writing to said Board of Harbor and Land Commissioners, that the work or any part thereof is unnecessarily or unreasonably delayed, or that the Contractor is violating any of the provisions of this contract, said Board may notify the Contractor to discontinue the work, and the Contractor shall thereupon discontinue said work, and the Commonwealth may, after the said notice, complete the work by contract or otherwise, and may pay the expense of the same, so far as may be, out of any moneys then due or to become due the Contractor under this contract. In case such expense is less than the sum which would have been payable under this contract if the same had been completed by the Contractor, the Contractor shall be entitled to receive the difference; and in case the expense shall exceed said sum, the Contractor shall pay the amount of such excess to the Commonwealth.

The Harbor and Land Commissioners, for the Commonwealth, may retain out of any amounts due the Contractor sums sufficient to cover any unpaid claims of mechanics, laborers or others for work done or materials furnished under this contract; *provided*, that notice in writing of such claims, signed by the claimants, shall have been previously filed with the Commissioners.

Estimates are to be made by the Engineer at the end of each calendar month of the value of the work completed in place, and payment to be made thereon of 85 per centum of the value of said work, as computed by the Engineer, the remaining 15 per centum to be paid upon the final completion and acceptance of the whole work, except as hereinbefore provided.

And when the Contractor shall have performed said work in the manner and in accordance with the terms and conditions aforesaid, the Commonwealth of Massachusetts will pay the Contractor the sum of (\$119,872.00) one hundred and nineteen thousand eight hundred and seventy-two dollars for the pile and timber platform and (\$1.00) one dollar for each ton (2,000 lbs.) of stone riprap furnished and placed as hereinbefore prescribed, these amounts to be in full compensation for all the labor and materials done, furnished, performed and completed under this contract, the payments

to be made at the times and in the manner and upon the terms and conditions hereinbefore set forth.

IN WITNESS WHEREOF, on the day and year first above written, the Commonwealth of Massachusetts, by the Board of Harbor and Land Commissioners, has caused these presents to be executed and delivered under the seal of the Commonwealth with the approval of the Governor and Council; and the said George A. Cahill has hereunto set his hand and seal.

THE COMMONWEALTH OF MASSACHUSETTS,

By WOODWARD EMERY, }
CLINTON WHITE, } *Harbor and Land*
CHAS. C. DOTEN, } *Commissioners.*

[SEAL.]

GEORGE A. CAHILL.

COMMONWEALTH OF MASSACHUSETTS.

In Council, March 8, 1899.

Approved :

EDWARD F. HAMLIN,
Executive Secretary.

Witness the seal of the Commonwealth :

[SEAL OF THE
COMMONWEALTH.]

WM. M. OLIN,
Secretary of the Commonwealth.

[B.]

[See page 8 of this report, *ante.*]

CONTRACT.

ARTICLES OF AGREEMENT MADE THIS SEVENTEENTH DAY OF MAY, IN THE YEAR EIGHTEEN HUNDRED AND NINETY-NINE, BY AND BETWEEN THE COMMONWEALTH OF MASSACHUSETTS, ACTING BY THE BOARD OF HARBOR AND LAND COMMISSIONERS WITH THE APPROVAL OF THE GOVERNOR AND COUNCIL, AND DANIEL E. LYNCH OF BOSTON IN THE COUNTY OF SUFFOLK AND COMMONWEALTH AFORESAID HEREINAFTER DESIGNATED AS THE CONTRACTOR.

The Contractor hereby covenants and agrees with the Commonwealth to provide all the labor and materials and to do and complete all the work necessary and proper to drain, pave and regulate Fargo Street on the Commonwealth Flats at South Boston from B Street across C and D streets to E Street, and E Street from the end of Fargo Street to Summer Street extension, all the work to be done and completed in the manner and in accordance with and subject to the terms and conditions set forth in the following specifications.

The word "Engineer" when used herein, shall mean the Engineer of the Board of Harbor and Land Commissioners, acting directly or through his properly authorized agents, when within the scope of the particular duties intrusted to them.

SPECIFICATIONS.

The Contractor is to furnish all the plant, tools, appliances, labor and materials necessary to drain, pave and regulate the streets as follows : —

SECTION 1. (a) Construct catch-basins and man-holes at points which are designated by the Engineer, with drains connecting them with existing sewers or extend the drains to a point or points where they can discharge into tide-water. Set edgestones and pave with granite blocks the roadway throughout the length of Fargo and a portion of E streets to make a continuous paved street from B street to Summer street extension, removing all old

materials from the site of the work and depositing those required to be kept for the Commonwealth in the vicinity of the work as directed by the Engineer, and furnishing and doing to the satisfaction of the Engineer everything required for the work.

(b) Carefully protect the work from injury from water, frost, accident or other cause, and repair any such injury; make good any defect, omission or mistake in the work within such time as shall be required in any notice so to do signed by the Engineer and given to the Contractor or mailed to him at the business address stated by him in his proposal, whether so given or mailed during the progress of the work or after its completion, and whether any inspection or approval of, or payment for, the work or any part thereof may have been made or certificate for such payment be given.

(c) Take charge of and be liable for any loss of or injury to any materials delivered on, or in the vicinity of, the work to be used thereon; notify the Engineer as soon as any such materials are so delivered, and furnish men to handle them for examination by the Engineer or his assistants; and keep trimmed up in piles so placed as not to endanger the work all such materials, and all refuse, rubbish and other materials not removed, and pay all charges and fees incident to the doing of the work.

(d) Leave an unobstructed way along public and private ways for travellers, street cars and teams, and for access to hydrants; from the beginning of twilight throughout the whole of every night maintain near all places in the public ways obstructed or made unsafe by the Contractor, sufficient lights to protect travellers in such ways from injury; provide proper walks for travellers over and around such places; provide and use all other lights, fences, guards and watchmen on and about the work as directed by the Engineer; provide all necessary bridges and ways for access to property where the existing access is cut off by the Contractor, and see that the neighboring residents are not unnecessarily inconvenienced; take all proper precautions to protect persons and property from injury by the carrying on of the work.

(e) Replace or put in good condition satisfactory to the Engineer any public or private way, or sewer or drain, or water, gas or other pipe or catch-basin, wire, building, fence, or other structure interfered with by the Contractor, and not required to be removed under this contract.

(f) Keep, as the property of the Contractor, and promptly remove from the work and its vicinity all materials rejected and directed by the Engineer or his assistant to be set aside, and the surplus of the refuse, rubbish and rejected materials, except such

rejected and other materials, refuse and rubbish as shall be provided for in these specifications, and such as the Engineer shall notify the Contractor that the Commonwealth will require.

(g) Maintain the flow in all the water-courses, sewers, drains, and pipes interfered with by the Contractor, or convey the flow in covered channels to a suitable point of discharge, in such a manner as not to flow upon or hinder the other work or cause any nuisance.

(h) The Contractor in doing the above shall, so far as they go, conform to these specifications and the plans and drawings of the work furnished by the Engineer, all orders in writing of said Engineer or of said Board, increasing the quantity or taking away any part of the work, or making any change in the form, materials, plans or specifications of the work, or requiring the Contractor to furnish any extra work or materials relating to the above; and shall cause all directions relating to the work, given by the Engineer, to be promptly carried out, and everything to be completed on or before October 1, 1899.

(i) All the filling required on the streets below the foundations of the paving and curbing will be done by the Commonwealth, but all trimming, levelling or removal of surplus material required to prepare the surface for the work herein contracted for must be done by the Contractor.

DRAINAGE.

Excavations.

SECTION 2. (a) The excavations are to be made to the grades and lines given by the Engineer, and to such further depths and widths and in such manner as will give ample room for building the structures to be placed thereon, and room for pumping, draining and removing any material which the Engineer may not deem proper for a foundation.

(b) The grade line is the line to which the excavations are to be made, and is as follows: Where concrete foundation is used it is the under side of the concrete; where timber foundation is used it is the under side of the platform or sills; where no foundation is used it is the under side of the lowest part of the sewer, pipe or other structure to be placed therein.

(c) If the Engineer shall determine that the material at or below the grade line is of improper nature for a foundation, it is to be removed to such other depths and widths and in such manner as he may direct.

(d) All excavations below the grade line are to be refilled to said line with such material and in such manner as the Engineer shall direct.

(e) The excavations are to be kept free from water at all times, and pumps are to be used and shifted frequently to avoid drainage from too long a distance.

(f) All excavations are to be maintained in good order at all times so as not to hinder or injure the other work, and are to be protected by sheeting and shoring so as to prevent caving or bulging; such sheeting and shoring to be left in place if, and as, directed by the Engineer, and if such sheeting and shoring is removed, it is to be removed in such a manner as to prevent caving in of the sides of the excavation.

Foundations.

SECTION 3. (a) The foundation at any given point cannot be determined in advance, but is to be decided upon, and may be changed, by the Engineer, as occasion demands.

(b) If a timber foundation is used it is to consist of sills, laid as directed, and a platform or flooring of plank, spiked to each sill with suitable spikes, and great care is to be exercised to prevent any washing away of the materials under the timber. On this concrete will be placed of the shape and dimensions shown on the plan.

Concrete.

SECTION 4. (a) All concrete is to be made in proper boxes just before being used, and is to be used in the foundations and side-walls as shown on the plans or as directed by the Engineer.

(b) The concrete is to be prepared from American hydraulic cement and sand and gravel of various sizes, free from clayey or other objectionable materials; no stone is to be more than two and one-half inches, and but very few less than one-fourth inch in greatest dimension.

(c) These ingredients are to be mixed in a manner approved by the Engineer, in the proportion of one part, by measure, of cement, to two parts of sand, and five parts of gravel or broken stones, and after the materials are wet the work must proceed rapidly until the concrete is in place and is so thoroughly rammed that all of the interstices between the stones are entirely filled with mortar, and water flushes to its surface.

(d) The concrete is to be laid in layers six inches in thickness, unless otherwise directed by the Engineer; each layer to be allowed to set for a sufficient time to be determined by the Engineer before walking over or making additions to it.

(e) In case any dirt or other objectionable material shall in any way get on to any layer it is to be carefully and entirely removed before the next layer of concrete is put on.

(f) Where forms are required to hold the concrete in place they are to be set true to the lines, and firmly secured, so that they will not get out of place while the concrete is being laid.

(g) Should voids be discovered in any concrete when the forms are taken down the defective work is to be removed, and the space refilled with suitable materials.

Appurtenances.

SECTION 5. (a) The man-holes and catch-basins are to be constructed of hard brick, laid in American hydraulic cement mortar to a line with the beds in the line of the radii of the curves, and with as close joints, not exceeding one-quarter inch for face work, as may be from time to time directed, and are to stand on a foundation of concrete or of timber and concrete as directed by the Engineer. The man-holes are to be capped by a cast-iron frame and cover. The catch-basins to be capped by a cast-iron D shaped frame and grate and a gutter-mouth is to be cut in the edgestone over each catch-basin, the top of the catch-basin, back of the edgestone to be covered by a stone slab. Wrought-iron steps are to be built into the sides of all man-holes and catch-basins as directed by the Engineer. The cast-iron frames, grates and covers and the iron steps are to be in every respect like those used for the same purpose by the city of Boston.

(b) The mortar is to be made in proper boxes just before being used, and no mortar is to be used that has become hard or set; it is to be prepared from cement and clean, sharp sand, free from loam and pebbles; these ingredients are to be thoroughly mixed dry in a manner approved by the Engineer, and in the following proportions: one part by measure of cement, to one and one-half parts of sand.

(c) Each brick, in laying brick masonry, is to be thoroughly wetted just before laying, and is to be completely imbedded in mortar under its bottom, on its sides, and on its ends, at one operation; care is to be taken to have every joint full of mortar, the hardest and most regular of the bricks are to be used for the inverts of manholes and bottoms of the catch-basins.

(d) No masonry is to be laid in water; no water is to be allowed to rise on any masonry until it has set at least twenty-four hours; and no drainage is to be effected over or through any drain without permission from the Engineer.

Pipes.

SECTION 6. (a) The pipes for the drains are to be the best Portland or Akron salt glazed sewer pipes, sound, straight, true in

shape and size and free from all imperfections; they are to be laid with Portland cement mortar joints and a closely fitting disc drawn through each two lengths of pipe and the joint left free from all obstructions.

(b) The pipes are to be evenly bedded so that no uneven strain will come on any pipe, and especial care is to be taken to prevent the pipes bearing on the joints.

(c) The pipes are to be made water tight, and if directed by the Engineer, the joints are to be calked with oakum.

(d) The pipes are to be connected with the catch-basins, man-holes and sewers in such manner as may be directed by the Engineer.

(e) All pipe is to be laid under the personal direction of the Inspector, and no line of pipe is to be covered until it has been examined by the Inspector in charge of the work, and directions given to cover the same.

(f) Wherever Y's or slants are placed in existing pipes or other structures, sufficient of the old work is to be removed therefor, and all mason work is to be done which is necessary to make up the joint in a good and workmanlike manner.

Refilling.

SECTION 7. (a) The greatest care is to be taken in refilling; the best of materials taken from the excavations are to be used.

(b) Good sand or fine gravel, entirely free from large stones, is to be carefully rammed and puddled beneath and around the pipes and other structures, special care being taken not to injure the alignment of the structure.

(c) The other parts of the refilling are to be spread in thin layers, well watered and thoroughly rammed.

(d) No mud or other objectionable material is to be used for refilling, unless otherwise authorized in writing by the Engineer.

Outlet and Tide-gates.

SECTION 8. (a) The outlet is to be through the granite sea-wall at the westerly end of the Reserved Channel.

(b) Enough of the wall to be taken down to allow the pipe to be laid through it, and after the pipe is laid is to be rebuilt and left as found.

(c) The pipe to be 24 inches in diameter and to be laid in Portland cement concrete through the wall except at the face of the wall, where it is to be surrounded by brick or stone masonry laid in Portland cement mortar.

(d) Immediately in rear of the sea-wall a double man-hole with double wooden tide-gates is to be built.

Lumber.

SECTION 9. Spruce lumber is to be furnished and used in the construction of wooden foundations for the sewers, man-holes, drains and catch-basins, and for other purposes, as shown on plans, or as directed by the Engineer; all lumber intended for permanent use is to be sound, straight-grained, and free from shakes, loose knots and other defects that may impair its strength and durability.

Cement.

SECTION 10. (a) The American cement shall be equal in quality to the best Rosendale cement, and the Portland cement equal to the best Dyckerhoff, Alsen or Brooks Shoobridge brands. The Engineer may require the use of any of these brands. All cement shall be fresh and very fine ground and put up in well-made casks.

(b) All cement will be subject to inspection and rigorous tests by the Engineer; and none shall be used or remain on the work but that which has been approved by him.

(c) The Contractor shall at all times keep in store, at some convenient point in Boston, or within a mile of the work herein contracted for, a sufficient quantity of cement to allow ample time for the tests to be made without delay to the work of construction. The Engineer shall be notified at once of each delivery of cement. It shall be stored in tight buildings, and each cask must be raised several inches above the ground, by blocking or otherwise.

PAVING AND REGULATING.

Excavation.

SECTION 11. (a) The excavations for the edgestones and roadway are to be carefully prepared; all spongy, vegetable and other objectionable and surplus material removed, and the bottom of each excavation brought by excavating or filling as follows:—

1. For the edgestones, a little above the sub-grade for the edgestones, which is twenty-four (24) inches below the top of the finished edgestones.

2. For the roadway a little above the sub-grade for the roadway, which is twelve (12) inches below the surface of the finished roadway.

(b) The bottoms of the excavations for the roadway, after being so excavated or filled, are to be thoroughly watered and made solid, compact, and of even surface at the sub-grades therefor with

a steam or two-horse roller or (in the parts which cannot be reached by the roller) with rammers; and if any such bottom before the work is completed shall, from shrinkage, removal of materials, or other cause, fall in any part below the sub-grade therefor, such part is to be filled with good, clean gravel, and thoroughly watered and rammed, after which the whole bottom is to be thoroughly watered and rolled or rammed as aforesaid to the sub-grade therefor.

Edgestones.

SECTION 12. (a) The edgestones are to be the best Cape Ann or Maine granite, seven (7) inches wide on top and twenty (20) inches deep, and not less than six (6) feet nor more than twelve (12) feet in length. On curves more than six (6) feet and less than twelve (12) feet in length two stones of substantially equal length to be used. The top to be pean hammered smooth. The face of the stone next to the roadway to be at right angles to the top and to be pointed smooth for its full height; the back to be pointed down at right angles with the top for a depth of three (3) inches. The ends to be cut so as to make close joints. The outer portions of the stone to be left rough and not less than seven (7) inches thick and twenty (20) inches deep.

(b) The trench for each edgestone is to be eighteen (18) inches wide and the bottom is to be at the sub-grade, twenty-four (24) inches below the top of the finished edgestone.

(c) Upon this bottom is to be laid a foundation of good, clean, coarse gravel, thoroughly rammed so that it will be four (4) inches thick when completed.

(d) Upon this foundation other gravel of the same kind is to be spread, the granite edgestone laid therein, the joints made as close as possible, and all the spaces under the stone thoroughly filled with gravel and tamped so that the stone will bear throughout its whole length, and be at the line and grade required.

(e) The trench on each side of the edgestone is then to be filled to the sub-grade for the roadway and sidewalk respectively, with good, clean gravel, laid in four (4) inch layers, and each layer thoroughly rammed and tamped under and around the edgestone.

(f) The joints between the edgestones are then to be carefully pointed, top, front and back with mortar made of equal parts of American hydraulic cement and clean, sharp sand.

(g) Good, clean gravel is then to be laid without ramming, against and up to the top of the edgestones on the sidewalk side, and the granite block paving laid against them on the roadway side.

(h) After the paving is laid and rammed the sidewalk is to be levelled off and surfaced with gravel or such other suitable material

as may be found in the excavation of the roadway, rolled or otherwise compacted to bring the surface even with the top of the edgestones.

Gravel Base.

SECTION 13. A gravel base for the stone paving is to be laid in the excavation for the roadway and is to consist of fine paving gravel that will pass through a screen with three-quarters ($\frac{3}{4}$) inch round openings, and very few that will pass through a screen with one-quarter ($\frac{1}{4}$) inch round openings, thoroughly rammed into a solid layer so as to be four (4) inches deep when completed.

Granite Block Paving.

SECTION 14. (a) The blocks to be used for paving are the standard granite paving blocks used by the street department of the city of Boston. They are to be of the best Cape Ann or Maine granite, equal in finish to the sample block kept in the office of the Superintendent of Streets of the city of Boston. Each block is to be three and one-half ($3\frac{1}{2}$) to four and one-half ($4\frac{1}{2}$) inches wide; seven and one-half ($7\frac{1}{2}$) to eight (8) inches deep, and nine (9) to fourteen (14) inches long, averaging not less than eleven and one-half ($11\frac{1}{2}$) inches; the edges are to be sharp and straight, forming right angles at their intersections, both horizontally and vertically, and the faces are to be straight-split and free from bunches and depressions exceeding one-half ($\frac{1}{2}$) inch.

(b) Upon the gravel base is to be laid a foundation of bedding sand, and in this sand the granite paving blocks in courses of uniform width and depth are to be laid at right angles with the line of the street, unless otherwise directed by the Engineer, and with close joints, the longitudinal joints broken by a lap of at least two (2) inches, sufficient sand being used to bring the blocks to the grade and form for the finished roadway after they have been thoroughly rammed as hereinafter provided.

(c) The blocks are to be covered with clean, fine-screened gravel, or coarse sand, the sand and gravel to be thoroughly dried by artificial heat, if necessary, and raked and swept until the joints of the blocks are filled therewith; the blocks are then to be thoroughly rammed to a firm, unyielding bed, their surface parallel to the grade and crown required, and are then to be again covered, and the covering raked or swept as aforesaid; the blocks are then to be again rammed until they are solid and secure at the grade and crown of the finished roadway; the entire area is then to be covered with a layer of the same gravel at least one (1) inch thick. No ramming is to be done within ten (10) feet of the face of the

paving that is being laid, and in doing the ramming one (1) rammer is to be employed to every two pavers.

Catch-basin and Man-hole Covers.

SECTION 15. (a) All existing catch-basin and man-hole covers are to be reset when necessary to conform to the line and grade required.

Flagging Cross-walks.

SECTION 16. (a) The flagging for the cross-walks is to be of granite flagging stone, each stone exactly two feet in width, not less than four feet in length, of the same thickness as the others, not less than six (6) inches nor more than seven (7) inches of the best grade and quality, of uniform color, the top to be rough pointed, and the ends jointed and square cut to the full depth of the stone.

(b) In the excavation for a cross-walk is to be laid a foundation for the flagging stones, of fine gravel and pebbles, free from stones larger than three-quarters ($\frac{3}{4}$) of an inch in greatest dimension, and thoroughly rammed into a solid layer, so as to be four (4) inches thick when completed.

(c) On this foundation other gravel of the same kind is to be spread, and the flagging laid therein and thoroughly rammed to a solid and unyielding bed, sufficient gravel being used to bring the surface of the stones to the grade and crown of the finished highway after being so rammed.

General Clauses.

SECTION 17. (a) The Contractor is not to assign or sub-let the work, but is to keep the control and charge of the work and of every part thereof, and give his personal supervision thereto, unless with the consent of the Engineer in writing; or shall keep a competent foreman always present when anything is being done on the work; and shall allow all other persons doing work for the Commonwealth free access thereto and shall not interfere with them in their work.

(b) All regulations of law or public authorities, controlling or limiting the method or materials to be used, or the actions of those employed in doing the work, are to be carefully observed, and all necessary permits are to be taken out, and all notices required are to be given.

(c) Figure dimensions in preference to scale dimensions are to be followed in all plans and drawings, and in case of any discrepancy between the figures and scale, or the drawings and specifications, the matter is to be submitted to the Engineer for

adjustment, and any work done by the Contractor before such adjustment is made shall, if the Engineer so requires, be replaced by work satisfactory to him.

(d) The lines and marks for the work are to be given by the Engineer, and the Contractor is to place, preserve and conform to the same.

(e) When for any reason the work is suspended, all the work is to be protected, and the roadways and sidewalks left unobstructed, and in a safe and satisfactory condition.

(f) Upon the completion of the work the Contractor is to remove from the premises all materials and refuse left from the construction, and to leave the premises in a condition satisfactory to the Engineer.

(g) Any unfaithful or imperfect work which may be discovered before the final acceptance of the completed structure shall be corrected immediately, and any unsatisfactory materials delivered shall be rejected on the requirement of the Engineer, notwithstanding that they may have been overlooked in previous inspection. The inspection of the work shall not relieve the Contractor of any of his obligations to perform good work as herein described; and all work of whatever kind which, during its progress and before it is finally accepted, may become damaged from any cause, shall be removed and replaced by good and satisfactory work at the expense of the Contractor, and all completed work shall be maintained by him in good condition until the final acceptance of the whole work.

(h) The Contractor hereby agrees to do such extra work in connection with the drainage, paving and regulating, as may be ordered in writing by the Board of Harbor and Land Commissioners, and to accept in payment for the same, its reasonable cost as estimated by the Engineer, plus 15 per centum of said estimated cost and to furnish any material which may be required for carrying out said extra work at its actual reasonable cost to the Contractor.

(i) The Contractor shall have no claim for compensation for extra work unless the same is ordered in writing by said Board, and unless the claim for the same is presented to said Board before the fifteenth day of the month following that during which each specific order is complied with.

(j) Convenient facilities for the inspection of the work shall be furnished by the Contractor whenever requested by the Engineer. All instructions and directions of the Engineer to be strictly observed and followed, and when the Contractor is not present to receive them, they shall be received and obeyed by the superintendent or foreman who may have charge of that particular work

in reference to which they are given. All of the work to be done to the satisfaction of the Engineer, and with such machinery and appliances, and by such methods, as shall be approved by him, and to the acceptance of said Board and not otherwise.

(*k*) The work is to be commenced at once and shall be completed as soon as practicable but not later than Oct. 1, 1899.

(*l*) In all operations connected with the work the Contractor shall comply with all laws or regulations affecting in any way the conduct of those engaged on the work, or the methods of doing the work, and persons employed in the performance of manual labor under this contract shall not be required to work more than nine hours in each day, and said nine hours shall constitute a day's work; and in the employment of mechanics and laborers in the construction of the work herein contracted for preference shall be given by the Contractor to citizens of the United States.

(*m*) The Contractor shall take all responsibility of the work and take all precautions for preventing injuries to persons and property in or about the work, and shall assume the defence of and indemnify and save harmless the Commonwealth, its officers and agents, from all actions at law and claims relating to labor or materials furnished for the work, or to inventions, patents or patent rights used in doing the work, or to injuries to any person or corporation received or sustained by or from the Contractor or his employees in doing the work, or in consequence of any improper materials, implements or labor used therein, or relating to any act, omission or neglect of the Contractor or his employees therein.

(*n*) In no event whatever shall the Contractor be entitled to any compensation from the Commissioners, their servants or agents, on account of any acts or omissions under or growing out of this contract.

(*o*) If the work to be done under this contract shall be abandoned by the Contractor, or if the Engineer at any time shall be of opinion, and shall so certify in writing to said Board of Harbor and Land Commissioners, that the work or any part thereof is unnecessarily or unreasonably delayed, or that the Contractor is violating any of the provisions of this contract, said Board may notify the Contractor to discontinue the work, and the Contractor shall thereupon discontinue said work, and the Commonwealth may, after the said notice, complete the work by contract or otherwise, and may pay the expense of the same, so far as may be, out of any moneys then due or to become due the Contractor under this contract. In case such expense is less than the sum which would have been payable under this contract if the same had been completed by the Contractor, the Contractor shall be entitled to receive the difference; and in case the expense

shall exceed said sum, the Contractor shall pay the amount of such excess to the Commonwealth.

(p) The Harbor and Land Commissioners, for the Commonwealth, may retain out of any amounts due the Contractor sums sufficient to cover any unpaid claims of mechanics, laborers or others for work done or materials furnished under this contract; *provided*, that notice in writing of such claims, signed and sworn to by the claimants, shall have been previously filed with the Commissioners.

(q) Estimates are to be made by the Engineer at the end of each calendar month of the value of the work completed in place, and payment to be made thereon of 85 per centum of the value of said work, as computed by the Engineer, the remaining 15 per centum to be paid upon the final completion and acceptance of the whole work, except as hereinbefore provided.

And when the Contractor shall have performed said work in the manner and in accordance with the terms and conditions aforesaid, on that part of Fargo Street lying between B and C streets and D and E Streets and E Street from the end of Fargo Street to Summer Street extension, the Commonwealth of Massachusetts will pay the Contractor therefor the following prices.

Item 1. — For each linear foot of 10-inch pipe drain furnished and laid, the sum of sixty-two cents (\$0.62).

Item 2. — For each linear foot of 12-inch pipe drain furnished and laid, the sum of seventy cents (\$0.70).

Item 3. — For each linear foot of 18-inch pipe drain furnished and laid, the sum of one dollar and ten cents (\$1.10).

Item 4. — For each linear foot of 24-inch pipe drain furnished and laid, the sum of two dollars and eighty cents (\$2.80).

Item 5. — For each linear foot of timber and concrete foundation furnished and laid under 10-inch pipe drain, the sum of forty-seven cents (\$0.47).

Item 6. — For each linear foot of timber and concrete foundation furnished and laid under 12-inch pipe drain, the sum of fifty-two cents (\$0.52).

Item 7. — For each linear foot of timber and concrete foundation furnished and laid under 18-inch pipe drain, the sum of sixty-four cents (\$0.64).

Item 8. — For each linear foot of timber and concrete foundation furnished and laid under 24-inch pipe drain, the sum of one dollar and five cents (\$1.05).

Item 9. — For each catch-basin built, including all materials for its construction, the sum of ninety dollars (\$90.00).

Item 10. — For each man-hole built, including all material for its construction, the sum of fifty dollars (\$50.00).

Item 11.—For each linear foot of straight edgestone furnished and set, the sum of eighty-five cents (\$0.85).

Item 12.—For each linear foot of curved edgestone furnished and set, the sum of ninety cents (\$0.90).

Item 13.—For each square yard of granite block paving furnished and laid with gravel joints, the sum of one dollar and ninety-five cents (\$1.95).

Item 14.—For each square yard of granite cross-walks furnished and laid with gravel joints, the sum of four dollars (\$4.00).

Item 15.—For furnishing material and building outlet for drain through sea-wall at head of Reserved Channel, including double man-hole with tide-gates, the sum of seven hundred and eighty dollars (\$780.00).

These amounts to be in full compensation for all the labor and materials done, furnished, performed and completed as aforesaid, including all incidental work, the payments to be made at the times and in the manner and upon the terms and conditions hereinbefore set forth. It being understood and agreed that the Contractor shall collect payment of the city of Boston for the performance of his contract on that part of Fargo Street lying between and across C and D streets, and shall make no claim against the Commonwealth on account thereof.

IN WITNESS WHEREOF, on the day and year first above written, the Commonwealth of Massachusetts, by the Board of Harbor and Land Commissioners, has caused these presents to be executed and delivered under the seal of the Commonwealth with the approval of the Governor and Council; and the said Daniel E. Lynch has hereunto set his hand and seal.

THE COMMONWEALTH OF MASSACHUSETTS,

By WOODWARD EMERY, }
CLINTON WHITE, } *Harbor and Land*
CHAS. C. DOTEN, } *Commissioners.*

[SEAL.]

DANIEL E. LYNCH.

COMMONWEALTH OF MASSACHUSETTS.

In Council May 24, 1899.

Approved:

E. F. HAMLIN,
Executive Secretary.

Witness the Seal of the Commonwealth:

WM. M. OLIN,
Secretary of the Commonwealth.

[SEAL OF THE
COMMONWEALTH.]

[C.]

[See page 6 of this report, *ante.*]

LEASE.

THIS INDENTURE, made the twenty-seventh day of November eighteen hundred and ninety-nine, between the Commonwealth of Massachusetts, acting by its Board of Harbor and Land Commissioners, of the first part, and Charles Taft Chapin of Boston in the County of Suffolk and Commonwealth aforesaid, of the second part,

WITNESSETH, That the said party of the first part doth hereby demise and lease unto the said party of the second part a parcel of land situate in Boston, bounded and described as follows, to wit:

Beginning at a point in the southerly line of E street as now built distant fifty-five (55) feet westerly from its intersection with the south-westerly line of Summer street; thence southerly at right angles with said line of E street, two hundred and eighty-three and ninety-eight hundredths (283.98) feet to the face of the sea-wall on the northerly side of the Reserved Channel; thence westerly along the face of said sea-wall, two hundred and sixty-four (264) feet; thence northerly at right angles with said line of E street, two hundred and eighty-three and ninety-eight hundredths (283.98) feet to the southerly line of E street; thence easterly by said southerly line of E street two hundred and sixty-four (264) feet to the point of beginning: Together with the flats in front of said parcel, three hundred (300) feet to the Reserved Channel; also including the pile wharf now building over a portion of said flats and the right to use the dock fifty (50) feet wide adjoining the east side thereof.

To have and to hold the same for the term of fifteen years, beginning with the first day of May next.

Yielding and paying therefor rent, at the rate of four thousand (4,000) dollars yearly, by equal half-yearly payments as follows, to wit: Two thousand (2,000) dollars on the thirtieth day of April, the same sum on the thirty-first day of October in every year during said term, and at that rate for such further time as the said lessee, or any other person or persons claiming under him shall hold the said premises or any part thereof; the first payment to be made on the thirty-first day of October A.D. nineteen hundred.

And the said lessor covenants and agrees with the said Lessee and his representatives, that he or they paying the rent aforesaid, and performing the covenants herein contained, on his or their part to be paid or performed, shall peaceably hold and enjoy the said premises without hindrance or interruption by the said Lessor or any person or persons whomsoever.

And the said lessee for himself and his assigns hereby covenants with and to the said Lessor that he will, during the said term, and for such further time as the said Lessee or any other person or persons claiming under him, shall hold the said premises, or any part thereof, pay unto the Lessor the said yearly rent upon the days hereinbefore appointed for the payment thereof, and also all the taxes, water rates and assessments whatsoever, whether in the nature of taxes now in being or not, which may be payable for or in respect of the said premises, or any part thereof during said term, and for such further time as the said Lessee or any person or persons claiming under him shall hold the said premises or any part thereof: excepting, however, assessments for any permanent benefit or improvement to said premises under any betterment law or otherwise, upon which, however, if made, he agrees to pay to the Lessor interest at six per centum per annum on the total amount thereof, payable at the times herein specified for the payment of rent; And, also will keep all and singular the said premises in such repair as the same are in at the commencement of said term, reasonable use and wear, and damage by accidental fire or other inevitable accidents only excepted.

And the said Lessee further covenants and promises with and to the said Lessor that he or others having his estate in the premises will not assign this lease nor underlet the whole or any part of the said premises, nor make nor allow to be made any unlawful, improper or offensive use thereof; nor do any dredging upon said premises without the consent of the said Board first being obtained in writing, allowing thereof; And, That it shall be lawful for the said Board at seasonable times to enter into and upon the same to examine the condition thereof; And, further, that the said Lessee and his assigns shall and will be responsible and will pay all damages and charges to the City Government or others for any nuisance made or suffered on the premises during said term: And, further, that the said Lessee and his assigns shall and will at the expiration of said term peaceably yield up unto the said Lessor all and singular the premises in good tenantable repair in all respects, reasonable wearing and use thereof and damage by fire or other casualties excepted.

And provided always, and these presents are upon this condition,

that in case of a breach of any of the conditions to be observed on the part of the Lessee or those claiming under him or in case the estate hereby created shall be taken from him or them by process of law, by proceedings in bankruptcy or insolvency or otherwise, the Lessor may, while default or neglect continues or at any time after such taking by process of law and notwithstanding any license or waiver of any prior breach of condition, without notice or demand, enter upon the premises and thereby determine the estate hereby created, and may thereupon expel and remove forcibly, if necessary, the Lessee and those claiming under him and their effects;

But it is agreed that in case of loss or damage by fire or other unavoidable casualty to the wharf aforesaid so that the same shall be rendered unfit for use and occupation, that a just and proportionate part of the rent hereinbefore reserved shall be abated until the same shall have been duly repaired and restored by the Lessor.

It is further understood and agreed that the Lessee and his assigns may erect structures suitable for their business on said premises and may remove the same at the expiration of this lease, but all such structures shall be and exist without charge or liability to the Lessor for creation or destruction from whatever cause.

IN WITNESS WHEREOF on the day and year first above written, the Commonwealth of Massachusetts, by the Board of Harbor and Land Commissioners, has caused these Presents to be executed and delivered under the seal of the Commonwealth, with the approval of the Governor and Council; and the said Charles Taft Chapin has hereto set his hand and seal.

[SEAL]

CHARLES TAFT CHAPIN.

THE COMMONWEALTH OF MASSACHUSETTS,

By WOODWARD EMERY,	} <i>Harbor and Land</i>
CLINTON WHITE,	
CHAS. C. DOTEN,	
	} <i>Commissioners.</i>

Approved in Council Dec. 6, 1899.

E. F. HAMLIN,
Executive Secretary.

Witness the Seal of the Commonwealth:

WM. M. OLIN,
Secretary of the Commonwealth.

[SEAL OF THE
COMMONWEALTH.]

[D.]

[See page 20 of this report, *ante*.]

VOTES OF THE BOARD OF HARBOR AND LAND COMMISSIONERS, PASSED NOV. 17, 1899.

WHEREAS, the Board of Harbor and Land Commissioners is authorized, under St. 1898, c. 278, entitled "An Act to change the harbor lines and provide for the improvement of South Bay in the city of Boston," as amended by St. 1899, c. 469, entitled "An Act relative to the improvement of Boston harbor," to take from time to time, for the purposes stated in said acts, the whole or a portion of the area lying between the harbor lines in South Bay;

AND WHEREAS, the Board has considered the takings and improvements authorized by said acts, and has decided upon and adopted a general scheme or plan to be carried out by it under the authority of said acts;

VOTED: That the plan now before the Board, marked "Commonwealth of Massachusetts, Harbor and Land Commissioners' Office. Plan of Soundings in South Bay. Boston Harbor. April, 1898. Scale $\frac{1}{1000}$," and in red, "Scheme for the improvement of South Bay by dredging the area shown on this plan included between Dover Street Bridge and the brown lines A-B-C-D-E-F-G-H. Adopted November 17, 1899, by the Board of Harbor and Land Commissioners, under the provisions of St. 1898, c. 278, and St. 1899, c. 469," signed by Woodward Emery, Clinton White and Chas. C. Doten, constituting the Board of Harbor and Land Commissioners, and by Frank W. Hodgdon, Engineer, be and the same hereby is approved and adopted as the scheme and plan which the Board contemplates carrying out; said scheme and plan contemplating the taking by the Board under said acts, absolutely in fee simple, free from all conditions and easements, subject to the approval of the Governor and Council, of that part of all that tract of land and flats now owned by the Commonwealth, and all the rights, easements, title and interest of every name and nature, of all persons and parties whatsoever, except the Commonwealth, in and to every part and parcel of said tract lying in South Bay between Dover Street Bridge and the brown lines A-B-C-D-E-F-G-H.

VOTED: That the original of the plan aforesaid be kept on file in the official archives of this Board.

THE TAKING.

COMMONWEALTH OF MASSACHUSETTS,

IN BOARD OF HARBOR AND LAND COMMISSIONERS,

at its regular meeting held this twenty-second day of November in the year 1899, it was unanimously VOTED :

THAT WHEREAS, the undersigned Woodward Emery, Clinton White and Charles C. Doten, having been duly appointed and qualified according to the provisions of the laws of the Commonwealth of Massachusetts, do now constitute the Board known as the "Board of Harbor and Land Commissioners;" and

WHEREAS, by chapter 278 of the Acts passed by the General Court of said Commonwealth in the year 1898, entitled "An Act to change the harbor lines and provide for the improvement of South Bay in the city of Boston," as amended by chapter 469 of the Acts of the year 1899, entitled "An Act relative to the improvement of Boston harbor," said Board was authorized to take the land, flats and rights hereinafter described; and

WHEREAS, by a vote and plan adopted November 17 in the year 1899, the said Board adopted a plan and scheme for the improvement of said South Bay in the city of Boston, as shown more fully by said vote and said plan now on file in the public records of said Board;

NOW, THEREFORE, We, the said Board of Harbor and Land Commissioners, acting for the Commonwealth of Massachusetts, by virtue of and in the exercise and partial execution of the power and authority given us by said acts, and of any and every other power and authority us hereto in any wise enabling and for the purposes authorized by said acts, have adjudged and do hereby adjudge the following described land, flats and rights to be necessary to carry out the purposes of said acts, and have taken and do hereby take, absolutely in fee simple, free from all conditions and easements, under the provisions of chapter 278 of the Acts of the year 1898 as amended by chapter 469 of the Acts of the year 1899, in the name and behalf of the Commonwealth and with the approval of the Governor and Council, all that tract of land and flats and all the rights, easements, title and interest of every name and nature of all persons and parties whatsoever in and to every part and parcel of said tract which is situated in South Bay as aforesaid and bounded as follows :

Beginning at a point on the south-westerly side of the fender guard on the south-westerly side of Dover Street bridge fifty (50) feet westerly from the harbor line established by chapter 278 of

the Acts of 1898, on the easterly side of South Bay; thence running south-westerly nine hundred and twenty-seven feet (927) feet to a point two hundred and ten (210) feet south-easterly from said harbor line on the north-westerly side of the bay; thence continuing south-westerly about one thousand seven hundred and sixty (1,760) feet on lines parallel with and two hundred and ten (210) feet south-easterly from said harbor line on the north-westerly side of the bay to a point distant four hundred (400) feet north-easterly from that portion of said harbor line which is parallel with Swett Street; thence deflecting south-easterly seventy-seven (77) degrees and running south-easterly about two hundred and sixty-nine (269) feet to a point two hundred and ten (210) feet north-easterly from said harbor line parallel to Swett Street; thence south-easterly, more easterly, about seven hundred and seventy-five (775) feet parallel with and two hundred and ten (210) feet distant north-easterly from the said portion of said harbor line parallel with Swett Street to a point fifty (50) feet distant north-westerly from the portion of said harbor line parallel with the New England Railroad; thence south-westerly about one hundred and sixty-three (163) feet; thence north-westerly about one thousand three hundred and forty-two (1,342) feet; and thence north-easterly about three thousand one hundred and eight (3,108) feet, all on lines parallel with and fifty (50) feet distant from said harbor line to a point in the south-westerly side of the draw-pier of Dover Street bridge distant fifty (50) feet south-easterly from said harbor line on the north-westerly side of the bay; thence by an irregular line following the outlines of the south-westerly side of Dover Street bridge and its appurtenances, to the point of beginning:

Comprising lands, besides those owned by the Commonwealth, supposed to belong to the West End Street Railway Company, Windsor Cement Company, Frank B. Tallman, Edward O'Brien, C. W. Leatherbee, Heirs of Edward F. Meany, Charles S. Waldo, Ham & Carter Company, Amelia B. Rowe, John W. F. Hobbs, City of Boston, Heirs of Joseph Dorr *et al.*, and Roxbury Central Wharf; but all names of owners herein stated, although believed to be correct, are given only as matters of information and belief.

Said premises are shown as included within red lines on a plan entitled "Commonwealth of Massachusetts, Harbor and Land Commissioners' Office. Plan of flats in South Bay, Boston, taken by the Board of Harbor and Land Commissioners under Statutes 1898, Chapter 278, as amended by Statutes 1899, Chapter 469," of even date herewith, signed by said Commissioners and by Frank W. Hodgdon, Engineer of Board, and to be recorded herewith.

All the foregoing described lands and flats and all the rights of all persons therein or included in the above description are taken under the provisions of chapter 278 of the Acts of 1898, as amended by chapter 469 of the Acts of 1899, in the name and behalf of the Commonwealth.

WITNESS the hands of the Board of Harbor and Land Commissioners acting for and in behalf of the Commonwealth of Massachusetts, this twenty-second day of November in the year of our Lord one thousand eight hundred and ninety-nine.

WOODWARD EMERY,	} <i>Harbor and Land</i>
CLINTON WHITE,	
CHAS. C. DOTEN,	
	} <i>Commissioners.</i>

Approved by order of the Executive Council, Nov. 29, 1899.

EDWARD F. HAMLIN,
Executive Secretary.

Witness the Seal of the Commonwealth :

WM. M. OLIN,
Secretary of the Commonwealth.

[SEAL OF THE
COMMONWEALTH.]

[E.]

[See page 47 of this report, *ante*.]REPORT OF THE SUPERINTENDENT, PROVINCE
LANDS.

PROVINCETOWN, MASS., Dec. 1, 1899.

To the Board of Harbor and Land Commissioners.

GENTLEMEN : — I respectfully submit the following report, covering operations on the Province Lands for the year ending Nov. 30, 1899 : —

Active operations were begun about the first of April, and we have continued the work about on the same lines as during the last two or three seasons, by covering the barren surfaces or slopes of the sand hills with beach grass, and introducing young trees, shrubs and seeds in the section covered. The first work was the transplanting of young trees and shrubs along the slopes, which have been covered with beach grass during the past two or three seasons, embracing the following varieties : about 27,000 young pines, about equally divided, as follows : 9,000 Scotch pine (*Pinus sylvestris*), 9,000 Austrian pine (*Pinus Austriaca*) and 9,000 native pitch pine (*Pinus rigida*) ; also about 6,500 plants of Scotch broom (*Genista scoparia*), 700 silver poplars and a considerable quantity of bayberry (*Myrica cerifera*).

A large percentage of the above trees and shrubs are doing well and show a very satisfactory growth, notwithstanding the very unfavorable weather conditions which existed during the season of transplanting, one of the most severe droughts known to this section prevailing during the work of transplanting, — in fact there was no rainfall of sufficient amount to measure during the months of April and May, and but very little in June.

The transplanting of beach grass was commenced about the last of April, but was only continued for a short time, on account of the drought, it being considered better to wait and spend more time and money in fall planting. The grass work was resumed about the middle of September and continued well into the month of

November, about 35 acres in all being planted during the season. All of this work is along the slope of the southern range of sand hills, commencing where we closed up the work of 1897, and extending for a distance of about 2,500 feet in an easterly direction; thus covering with beach grass, from the beginning of the work to the present time, about 125 acres.

We have continued the use of pine seed, as before, among the transplanted grass and along the foot of the slopes; but the unusual drought during the early part of the season prevented the seed germinating as abundantly as in former years, only fair results being obtained.

Our experience the past four years in beach-grass planting has proved to us that the greatest care should be taken in the selection of grass for transplanting; and we have frequently been obliged to go a considerable distance, to secure the best new grass with an abundant root growth. The advantage of fall planting arises from the fact that new grass with good root growth can more readily be obtained in the fall than in the spring.

I am glad to be able to report that, although these lands during the last winter were swept by some of the most violent storms and gales on record, no damage resulted to the completed work, and the slopes which have been covered with beach grass showed that no breaks had occurred and no sand had moved over the entire section thus covered; thus demonstrating, as it seems to me, the wonderful sand-binding qualities of the grass, and that the movements of the great sand dunes which have for years been gradually towards and upon the wooded sections of these lands, and threatening their destruction, can be successfully stopped by its continued use.

I am glad also to be able to report a very favorable condition of the work from its commencement in the spring of 1895, especially along the northern range of sand hills, where the first two years of beach-grass planting was done and the first introduction of young trees and shrubs made, most of these trees and shrubs showing a vigorous and healthy growth, and fully meeting expectations.

But little attention has been given to the cultivation of plants in the nursery during the year. We took therefrom in the spring the young pines and Scotch broom that were used for transplanting, but no work of replanting was done, and it probably will not be necessary in the future to make much use of it for the propagation of young pines; but I think it advisable to make use of it to a certain extent for the starting of the Scotch broom, which must be chiefly introduced by transplanting, as I am still strongly impressed with the value of this shrub in our work.

Nothing has been done during this season towards extending the State road, but some work has been necessary in keeping this and other roads through the Province Lands in good condition, and safe and convenient for public travel.

Respectfully submitted,

JAMES A. SMALL,
Superintendent of the Province Lands.

INDEX.

COMMISSIONERS' REPORT.

	PAGE
Hearings, etc.,	3
The Commonwealth Flats at South Boston,	5
The Commonwealth Pier,	6
Congress Street,	8
Summer Street,	9
Northern Avenue,	9
The Commonwealth Flats at East Boston,	10
Boston Harbor,	12
Anchorage,	16
Dredging by the Commonwealth,	17
Charlestown Navy Yard,	17
Fort Point Channel,	18
Shirley Gut,	19
South Bay,	19
Cove Street Bridge,	21
Charles River,	21
Mystic and Chelsea Rivers,	22
Cape Cod Canal,	23
Boat Harbors,	27
Green Harbor,	27
Lake Anthony,	29
Osterville,	30
Menamsha,	31
Scorton Harbor,	31
Surveys,	32
Witchmere Harbor,	34
Lewis Bay,	37
East Bay,	40
New Bedford Harbor,	43
Woods Hole Channel,	43
Vineyard Haven,	43
Connecticut River,	45
Great Ponds,	45
Province Lands,	46
Back Bay Lands,	47
Hangman's Island,	48
Great Storm of November,	48
Wrecks and Obstructions,	49
Work of the United States in Rivers and Harbors of the Commonwealth,	50
Statement of Col. Chas. R. Suter, Corps of Engineers, U. S. A.,	50
Statement of Maj. D. W. Lockwood, Corps of Engineers, U. S. A.,	53

	PAGE
Inspections,	55
Licenses granted during the Year,	60
Miscellaneous Permits granted during the Year,	71
Harbor Compensation Fund,	74
Commonwealth's Flats Improvement Fund,	74
Salaries of Commissioners,	74

APPENDIX.

Contract with George A. Cahill for building a Pile Platform at the New Pier on the Commonwealth's Flats at South Boston,	77
Contract with Daniel E. Lynch for draining, paving and regulating Streets on the Commonwealth's Flats at South Boston,	86
Lease from the Commonwealth to Charles Taft Chapin of Land, Flats and Wharf on the Reserved Channel at South Boston,	100
Votes of the Board of Harbor and Land Commissioners, Nov. 17, 1899,	103
Taking of Land, Flats and Rights in South Bay in the City of Boston,	104
Report of the Superintendent of the Province Lands,	107

